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NOVEMBER 1941

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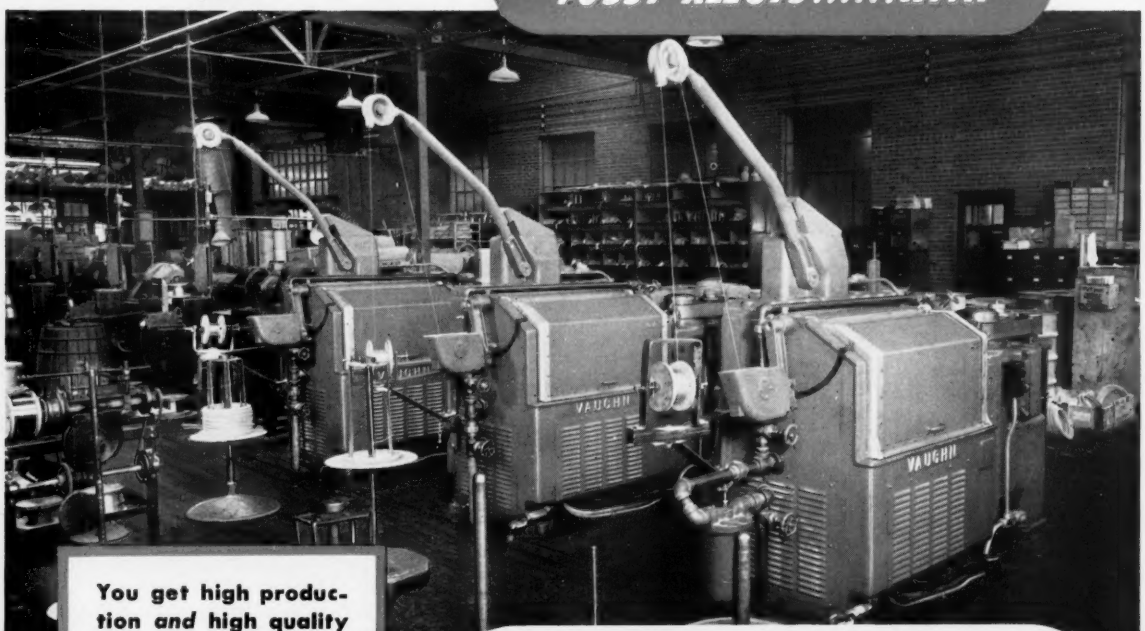

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OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

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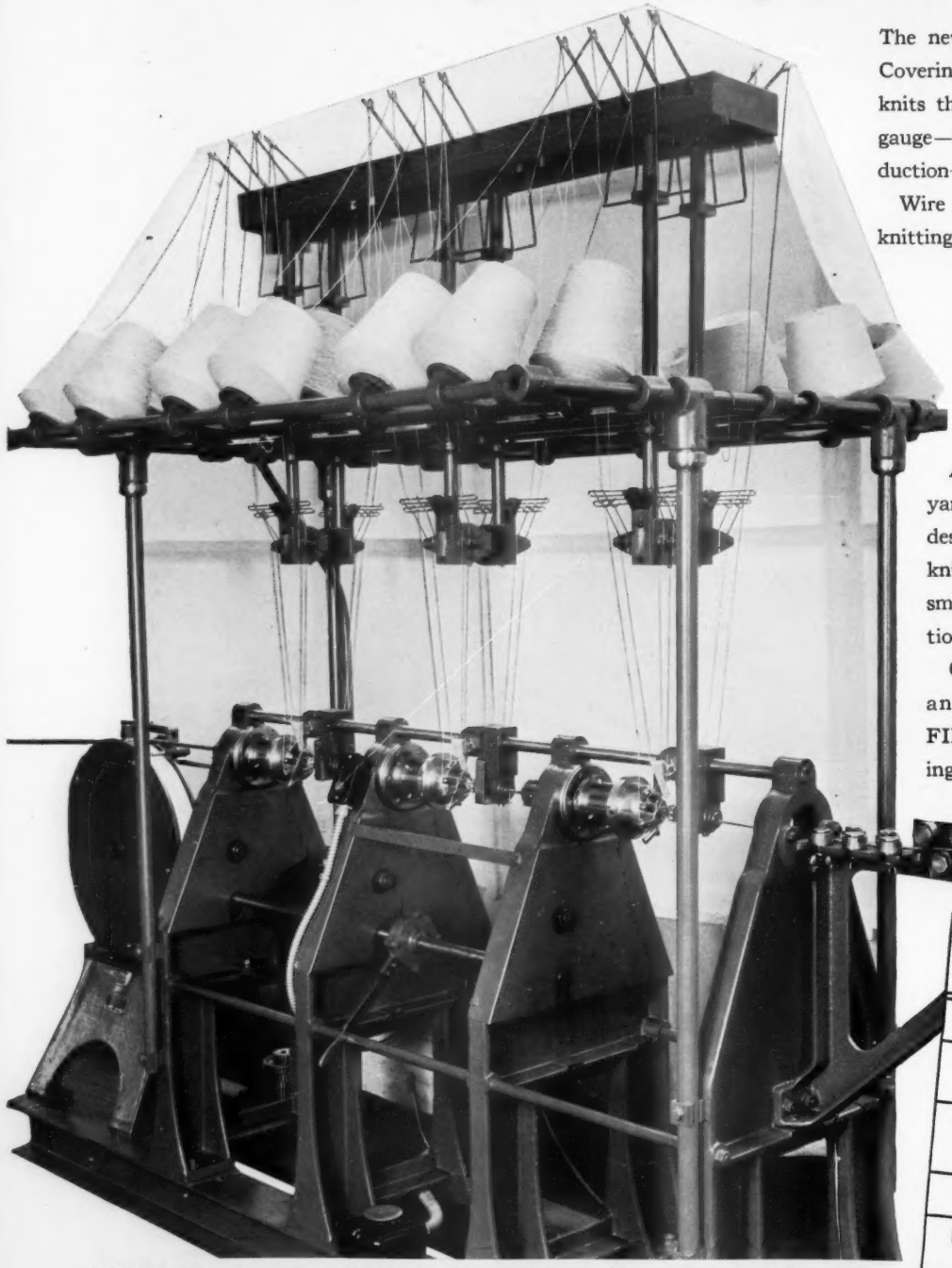

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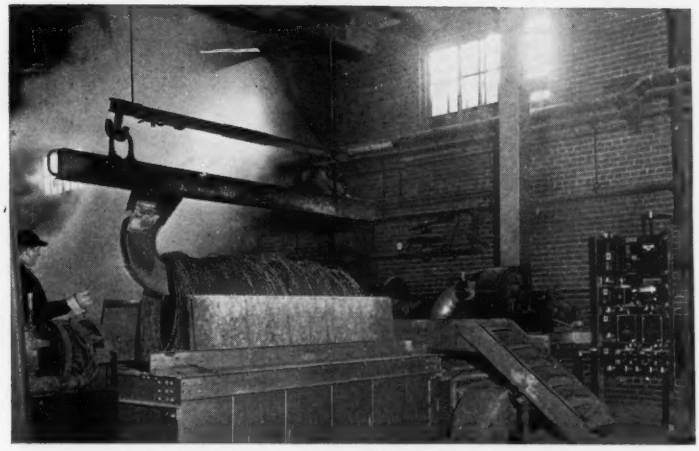

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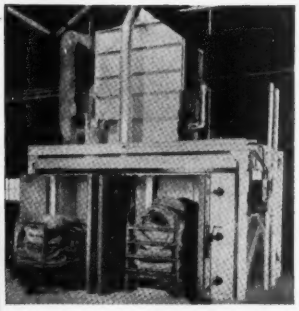

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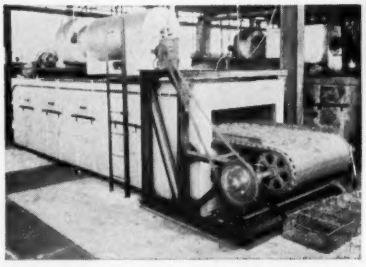

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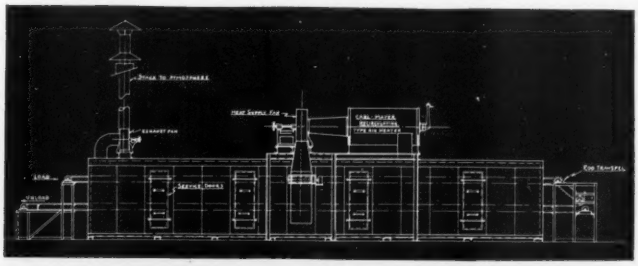

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WHEREAS, the October Convention Number of Wire and Wire Products played an important part in and contributed much to making the Convention a success.

NOW THEREFORE, be it resolved by the Publishers of Wire and Wire Products that they set their hands, heads and hearts to the issuance of a Post-Convention number in January that shall do credit to that great event.

Done this Fifth Day of November, in the Year One Thousand Nine Hundred and Forty-one.

Wire & Wire Products
OFFICIAL ORGAN OF THE WIRE ASSOCIATION

The January Issue Will Contain:

The Mordica Memorial Lecture, an outstanding feature of the Convention delivered annually in commemoration of the late John Mordica, first president and one of the founders of the Wire Association.

Copies of the recorded discussions of the papers presented at the technical sessions of the Wire Association.

A list of persons attending the Annual Convention.

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THIS IS OUR ONLY OTHER SPECIAL ISSUE. It is read and studied by the entire field — both those who attended and those who were not present at the Convention. This January Post Convention Number offers great advertising value. Every concern with products, equipment, supplies or services bought by the Wire Industry should be represented in it. It is a honey of an advertising medium. We invite you to make space reservations. Please send them today, now, while you have this reminder before you.

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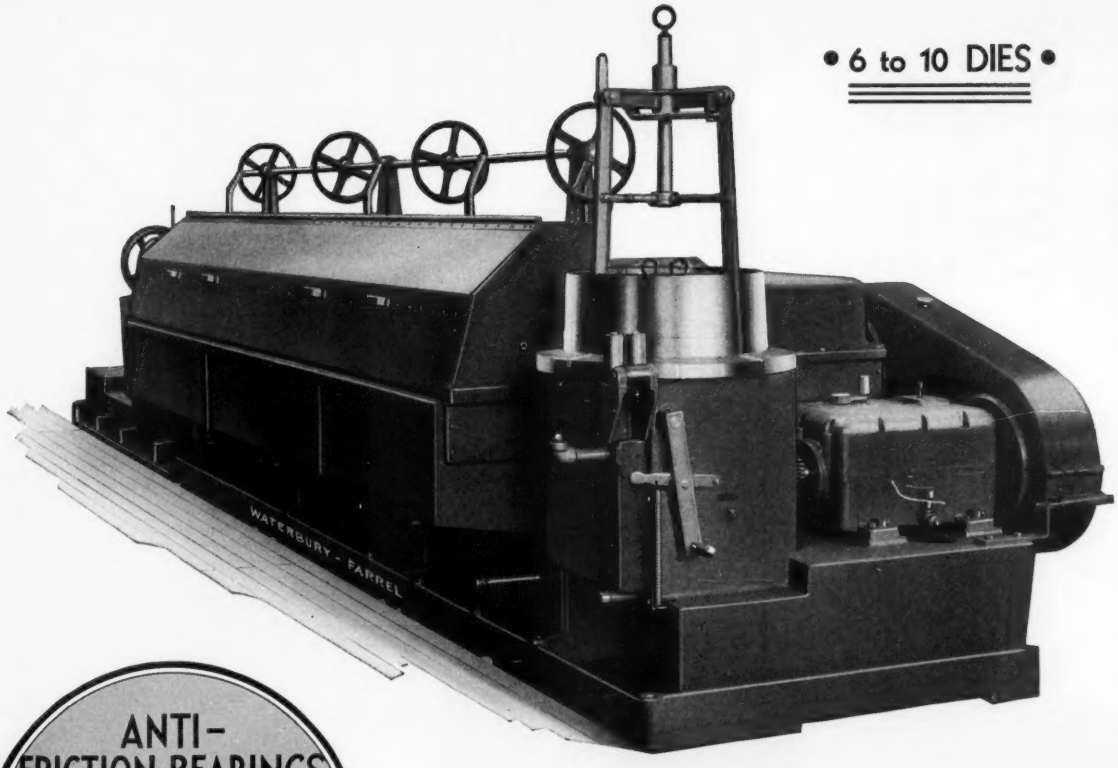

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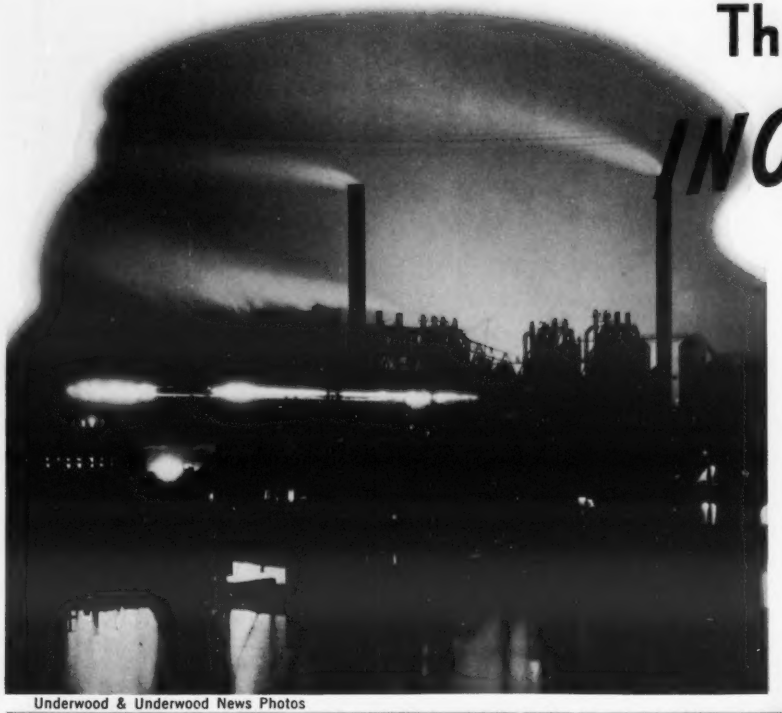

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 16 NOVEMBER, 1941 No. 11

Designated as

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Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 16 NOVEMBER, 1941 No. 11

Electrolytic Zinc Coated Wire

By L. H. Winkler,
Metallurgical Engineer,
Bethlehem Steel Co., Bethlehem, Pa.

A description of the electrolytic process of zinc coating wire as developed by the Bethlehem Steel Company. This paper was presented before The Wire Association Convention at Philadelphia, Pa., October, 1941. ✦ ✦ ✦ ✦ ✦

Introductory

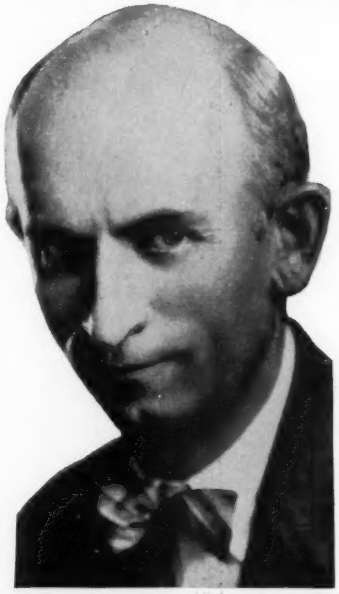
IN this paper we shall describe the electrolytic process of zinc coating wire as developed by the **Bethlehem Steel Company,** and touch on some of the properties of the product, which we have merchandised under the trade name "Bethanized Wire", and give a few representative applications.

✦ ✦ ✦

IN order to bring out the special qualities of Bethanized Wire, it may at times be necessary to draw comparisons between that product and hot galvanized wire. Comparisons are sometimes misunderstood, but we hope that our discussion will not in any way be interpreted as derogatory to hot galvanized wire for those services to which it is particularly well adapted, and where it has already given a very good account of itself in actual usage.

✦ ✦ ✦

THE mechanism of corrosion is so complex that even though the subject has received much study, and many theories of the phenomenon have been advanced, it is probably safe to say that our actual knowledge of the subject has not progressed as far as is desirable. Many attempts have been made to devise laboratory tests which could serve as a basis for evaluating corrosion resistance of various materials under the many and varied conditions which are met in actual service. So far, however, none of these tests have proved to be thoroughly reliable inasmuch as long-time exposure tests under actual service conditions have more frequently reversed the predictions based on such laboratory tests than sustained them. It is for this reason that national engineering societies, notably the **American Society for Testing Materials,** have undertaken research into this question of corrosion by elaborate programs of testing at various locations and in various atmospheres under actual exposure conditions. **The American Society for Testing Materials,** through its Committee A5, has had under way for a number of years a most interesting and valuable series of exposure tests. This work has steadily progressed and there is now available, particularly on sheets, information of much practical value. Even though the results so far obtained have in many respects reversed previous impressions



L. H. WINKLER

University of Missouri, B.S. in M.E., 1907. University of Missouri, Mechanical Engineer 1909. Engineering Department, Cambria Steel Company at Johnstown, Pennsylvania, 1907-1909. Metallurgical Department, Cambria Steel Company, 1909-1917. Engineer of Tests, Cambria Steel Company, 1917-1928. (The Cambria Steel Company was purchased by the Bethlehem Steel Company in 1923.) Metallurgical Engineer, Bethlehem Steel Company at Bethlehem, Pennsylvania, 1929-19--. Member of the Wire Association, American Petroleum Institute, Iron and Steel Institute (Great Britain), American Society for Testing Materials, and American Society for Metals.

gained from accelerated laboratory tests, our basic knowledge of materials has been considerably broadened.

✦ ✦ ✦

FOR five years the Committee has had under way similar exposure tests on wire and wire products at several locations between the Atlantic Seaboard and the Pacific Coast. The samples used in these tests include zinc coated wire having coating weights covering the entire range from the lightest coating made to the heaviest commercial coatings. Doubtless, in a few years we shall realize much valuable information from this commendable and extensive work of the Society.

✦ ✦ ✦

IT is well known that steel exposed to the elements should be protected by some means. Various paints and metallic coatings are used for this purpose. When unprotected steel is exposed to the atmosphere, it rusts. The rapidity of this rusting depends largely upon the atmospheric conditions under which the steel is exposed. If the atmosphere is dry and free from industrial gases, corrosion does not progress rapidly. This accounts for the fact that some of the iron specimens made by the ancients have withstood the actions of the elements for hundreds of years. Those specimens, however, when transferred to a different atmosphere, for example, London, England, showed rapid deterioration in a few years.

✦ ✦ ✦

METALLIC iron is unstable when exposed to many atmospheric conditions. Iron appears in nature in the form of an oxide which has a chemical composition similar to that of rust; so the film of rust which forms on exposure is simply a case of iron reverting back to its original condition and the only thing that we can do, in our efforts to prolong the life of steel, is to provide means of retarding this action.

✦ ✦ ✦

IN addition to paint as a means of preserving the surface of steel, various metallic coatings have been applied, such as coatings of copper, tin, nickel, chromium, lead and zinc. All of these metals corrode, but their rate of corrosion and the character of the corrosion products differ.

✦ ✦ ✦

THE most commonly adopted protective coating for steel wire is zinc. Actual long-time exposure tests, which have been conducted up to the present time, have indicated that the life of zinc coatings is at least proportional to the amount of zinc in ounces per square foot of surface. It is the opinion of some observers that the life of the coating increases in more than direct ratio to the coating weight. But the actual ratio can be determined only by exposure tests such as those which are now being conducted by the **American Society for Testing Materials.** As the very heavy coatings, which have come into use in recent years, have not been in existence long enough to provide actual data, it has been our policy to base a conservative estimate on indications which have so far resulted from exposure tests of the lighter coating, namely, that the life of a zinc coating is at least proportional to the weight of zinc in ounces per square foot of surface.

✦ ✦ ✦

SINCE there appears to be no accelerated tests so far developed which are dependable as a measure of the life of zinc coatings, apparently the best procedure is to evaluate the zinc coating by the standard **A. S. T. M.** procedure for determining the actual amount of zinc present in ounces per square foot of surface area

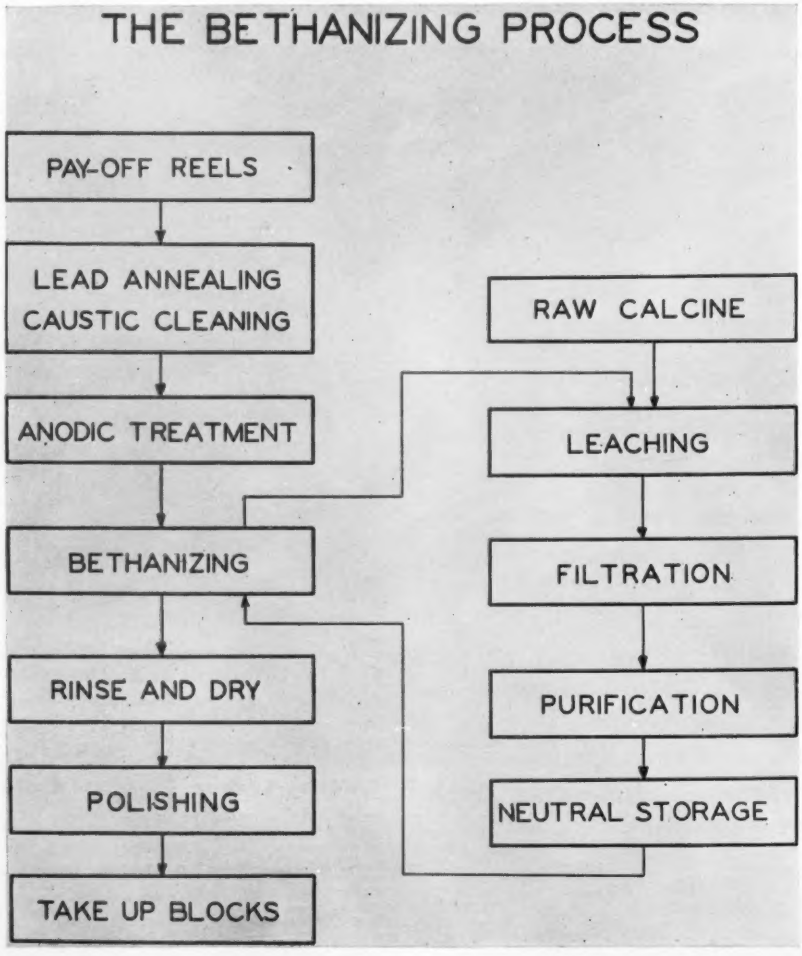


Figure 1. Flow-Sheet of the Bethanizing Process.

and estimate an expected life in a specific location from experience with known coating weights in that location. The **Preece** test was the first test employed for evaluating zinc coatings, but it has been found less reliable than the standard stripping test described in **A. S. T. M. Procedure A90.** Unfortunately, the **Preece** test is based on the rate of solubility of the coating in a copper-sulphate solution and it has been found that many factors influence the results. Impurities in the zinc,—for example iron,—will influence that rate of solubility. As a consequence, where a four immersion **Preece** test wire would normally be expected to carry at least 0.8 oz. of zinc per square foot of surface there have been instances where a contaminated coating of zinc would show 5 or 6 immersions when the actual weight of coating did not greatly exceed 0.5 oz. of zinc per square foot of surface; hence it is evident that the **Preece** test is not a reliable measure of the amount of zinc being furnished. Moreover, there is no evidence to point to any relation between the rate of solubility of a zinc coating in a copper-sulphate solution and the behavior of that coating under actual exposure conditions. As a result of all this, many engineers are placing more dependence on the stripping test and less dependence on the **Preece** test.

✦ ✦ ✦

Zinc Coating Processes

ON account of the great economic importance of zinc coatings as a protection against the corrosion of steel, a great deal of research and effort has been devoted toward improvement in the quality of those coatings and improvement in the processes for applying them. Until the time the electrolytic methods were fully developed, the most practical means of applying zinc coatings to wire have been the hot galvanizing processes, the procedures of which have also been greatly improved in recent years. We shall, however, confine ourselves to the discussion and the description of the strictly electrolytic method which

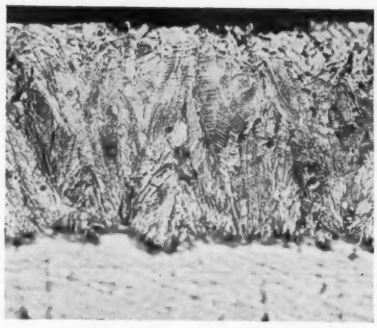


Figure 2. Etched Structure of Bethanized Coating. No. 6 gauge wire with 3 oz. coating weight. Magnification 500 diameters. ✦ ✦ ✦

has been perfected in recent years by the **Bethlehem Steel Company** and as employed in our wire mills. For a good many years before the development and application of the Bethanizing process, the zinc coatings applied by the means at our disposal did not have as good mechanical qualities as were needed to keep step with progress in the extending field of application of galvanized steel products.

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THE need for heavier zinc coatings than those available has become increasingly evident, as has the need for heavy zinc coatings which would withstand the drastic deformations incident to the fabrication of heavily coated wire and sheets. Everyone has experienced the disappointment of zinc coatings flaking off wire and sheets when subjected to drastic forming operations. When wire or sheets had to undergo severe fabrication, it was found expedient to apply only thin coatings of zinc; otherwise the coating would peel off as a result of the forming operations. By means of this new electrolytic process we are able to apply coating weights covering the full range of zinc coatings beginning with those even lighter than might be applied by the hot galvanizing method up to a coating weight several times as heavy as has been found practical to apply by the hot galvanizing method. In addition to this, owing to the extreme purity of the zinc, produced under this process, the coating metal has ductility properties far beyond those that have been customarily associated with zinc. This great ductility, aided by the perfection in the bond between the zinc and the steel, has enabled us to produce wire which will withstand mechanical work to an exceptional degree without damage to the coating resulting from cracking or flaking.

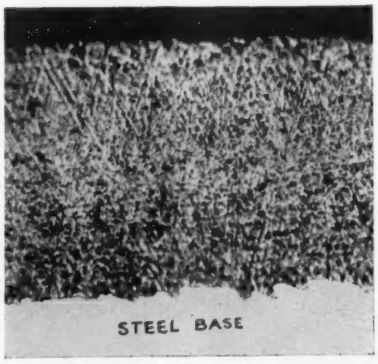

Figure 3. Unetched Section of Bethanized Wire. No. 6 gauge wire with 3 oz. coating weight. Magnification 500 diameters, showing junction of zinc and steel. ✦ ✦ ✦ ✦

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Development of Electrolytic Galvanizing

THE first electrogalvanizing process which has been applied on a large commercial scale seems to have been that developed at the **Langbein-Pfhannhauser Werke** in Germany. It appears that **Langbeins** used a neutral zinc sulphate bath as an electrolyte and plated from zinc anodes at moderate current densities (50 to 100 amperes per square foot). There may have been nothing new about the actual plating process at that time, but **Langbeins** was apparently the first to develop the necessary wire handling methods combined with a more satisfactory cleaning process, thus making possible a commercial scale operation in the production of reasonably heavy coating weights.

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WITH certain variations in bath composition, and methods of cleaning, essentially similar processes employing soluble zinc anodes have been used in electrogalvanizing plants installed in the United States in the last few years. Prior to the development of the Bethanizing process, it appears these processes were mainly used on narrow strip and the coatings applied were relatively light. Later, however, there

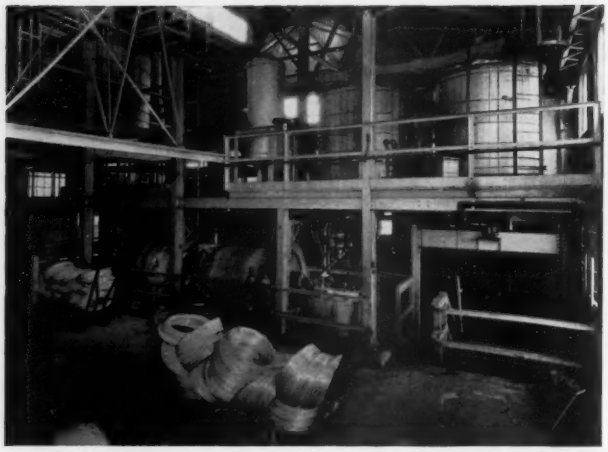

Figure 4. View of Leaching Plant for Preparing Pure Zinc Sulphate Electrolyte. Showing leaching vats, purificaton vats, filters, pumps and storage tanks.

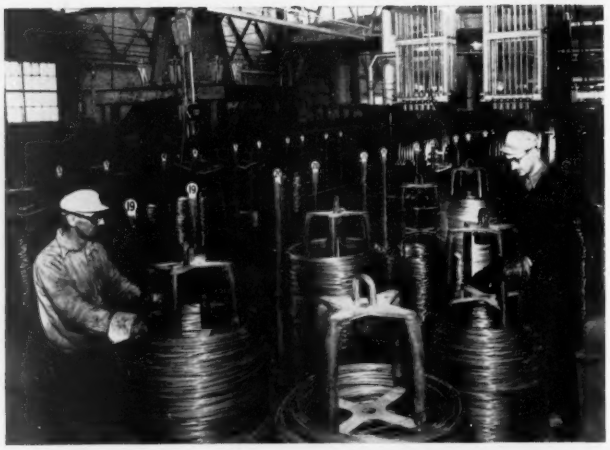

Figure 5. Pay Off Reels of Carrying Wire to be Galvanized. Successive coils of wire are electric butt welded into continuous strands.

has been other equipment built in the United States representing marked improvement over the older electrogalvanizing methods which were their predecessors. By means of this new equipment, heavier coatings can be produced than were formerly possible.

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IN view of the fact that we have had no experience with the processes employing soluble zinc anodes and know little of the details of the operation of those processes, this paper will be confined to the process used by the **Bethlehem Steel Company,** in which an insoluble lead-silver anode is used and in which there is no metallic zinc in the process until it appears as pure virgin zinc on the surface of the wire, as a result of electrolyzing the zinc from the sulphate solution.

The Bethanizing Process

U. C. **TAINTON** developed a method for the extraction of zinc from its ore, combined with the electro-deposition at high current density of that metal in cyclic process. The basis of this process was a leaching of zinc oxide from roasted zinc ore by means of sulphuric acid to form a neutral zinc sulphate solution, the purification of this solution by means of zinc dust, the use of the purified solution as a feed to the zinc depositing cells, and the use of the excess acid regenerated in the cells from the zinc sulphate solution as the leaching medium for the ore.

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IN his plant at Kellogg, Idaho, built by the **Bunker Hill and Sullivan Mining Company, Mr. Tainton** was the first to produce the so-called 99.99 zinc which due to its purity was found to have valuable properties which are now widely known and extensively used in industry.

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IN the early stages of his work, **Mr. Tainton** built a pilot plant in England for depositing zinc directly on wire and other ferrous products. There were a number of reasons why the idea failed to take hold at that time; the principal reason, doubtless, was the fact that industry was not yet ready for this product.

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IN 1931, **Mr. Tainton** moved to Baltimore, Maryland, and set up a laboratory with a sizeable research staff. In this laboratory a wire plating unit was built and a fair quantity of wire was plated for tests and exhibit. Bethlehem's

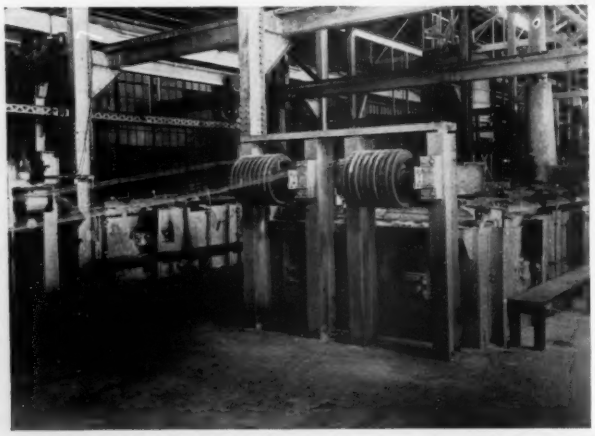

Figure 6. View of Caustic Soda Cell. Continuous strands of wire pass through molten caustic soda electrolytic cleaning cell; the passage of the current is such that the wire is made the cathode.

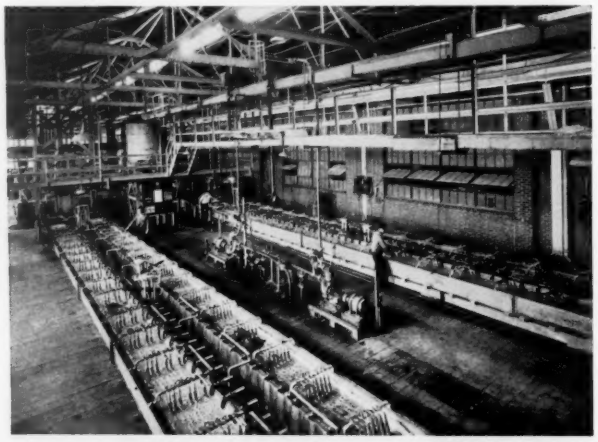

Figure 7. View of Plating Cells. Each of these four cells carry eight wires. Caustic soda cells and pay off reels in background.

decision to acquire rights to the process was based on the performance of this laboratory unit and a pilot unit of production size was built at Sparrows Point, Maryland, in 1932.

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AFTER very considerable further development work and numerous rebuildings of this equipment, in January, 1934 it was apparent that enough of the serious difficulties had been overcome to permit the operation of the plant at full capacity and at a reasonable cost per ton of product. For a time the production at Sparrows Point was confined largely to special wires of coating weights ranging from those comparable to charcoal wiped hot galvanized wire to approximately three times the coating weight obtainable by the hot galvanizing processes. During this period, of course, it was necessary for us to develop a market for the product.

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FORTUNATELY, as previously indicated, industry was now ready for this type of commodity and the demand kept pace with our increasing ability to produce this new special type of zinc coated wire. Sufficient progress had been made to justify our Company in building a new and larger unit at the Johnstown Plant in 1936. To meet the requirements at that time, two 12-wire cells, 110 feet long, served by a 40,000 ampere generator were built, as compared with the four 55 foot, 8-wire cells at the Sparrows Point Plant served by a 12,500 ampere generator. Since that time extensive additions have been made at Sparrows Point.

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COMPARING the present process and the equipment with the original, the leaching and plating steps have remained fundamentally the same, but have been improved in detail, and to such an extent that a different order and purity of uniform electrolyte is now available and the quality of the coating has correspondingly improved. Important improvements have also been made in the methods and details employed in the cleaning of the wire preparatory to plating.

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THE product of the Bethanizing process, thus developed from the basic methods of **Mr. Tainton,** is definitely an electrolytic zinc coated wire. Bethanizing is distinct from the older electrogalvanizing processes in that, as already pointed out, no metallic zinc appears in the system until it is electrolyzed from the solution as virgin zinc on the wire as a finished product. This is because the calcined zinc concentrate is the raw material source of the zinc instead of the zinc anode as employed in the older electrogalvanizing methods.

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THE Bethanized coating differs from the coating produced by the hot dip methods in several important respects. The ductility of the Bethanized zinc coating is perfect, due to the absence of impurities and to the absence of the harder and more brittle zinc iron alloy which is present when steel is galvanized by the hot dip process. The absence of this zinc iron alloy and the high purity of the electrolytic zinc provides a ductility of coating which has never before been associated with zinc coatings. As a consequence of the perfect bond resulting from the cleaning methods and the characteristics of the electrolytically deposited zinc, it is possible to employ fabricating operations on extremely heavy coatings that could never before be realized, even including the severe mechanical work involved in very substantial cold drawing subsequent to the Bethanizing operation. Furthermore, by this process, we have found it possible to zinc coat any type of steel wire that demands might indicate as desirable and, by utilizing the full flexibility of the process supplemented by subsequent cold work, obtain physical properties of a much greater range than could be realized by the older hot galvanizing methods. It is apparent that this has opened up a much wider and more diversified field of application for zinc coated wire.

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Description of the Process

FOR the sake of a better understanding of the operation of this process, we have prepared a flow-sheet showing the several

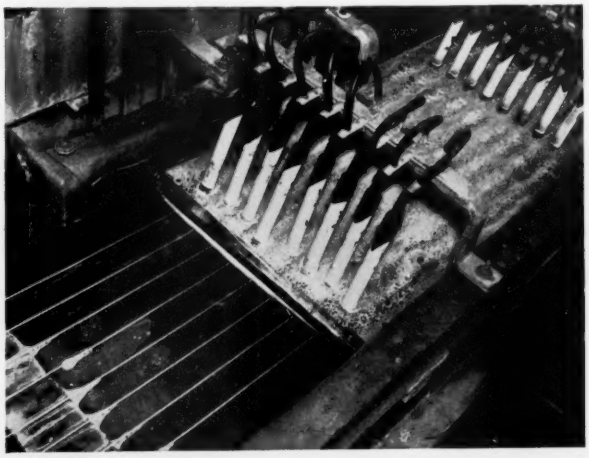

Figure 8. Close-up View of Plating Cell.

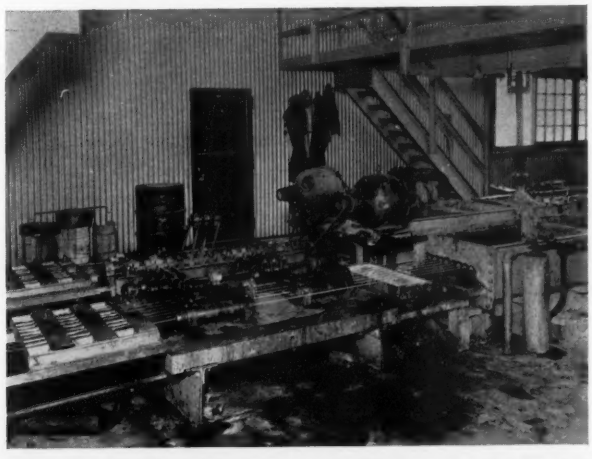

Figure 9. Burnishing Machines for Polishing Finished Bethanized Wire.

TABLE I

Nominal Diameters and Minimum Weights of Coating for Zinc-Coated Steel Wires

Note: For intermediate sizes of wire in the strand, the weight designations are the same as for the next finer size shown in this table.

Nominal Diameter of Coated Wire in the Strand, Inch	Minimum Weight of Coating, oz. per sq. ft. of uncoated wire surface			
	"Galvanized"[a]	Class A[b]	Class B[c]	Class C[c]
0.041	0.15	0.40	0.80	1.20
0.052	0.15	0.40	0.80	1.20
0.062	0.15	0.50	1.00	1.50
0.065	0.15	0.50	1.00	1.50
0.072	0.15	0.50	1.00	1.50
0.080	0.30	0.60	1.20	1.80
0.093	0.30	0.70	1.40	2.10
0.100	0.30	0.70	1.40	2.10
0.104	0.30	0.80	1.60	2.40
0.109	0.30	0.80	1.60	2.40
0.113	0.30	0.80	1.60	2.40
0.120	0.30	0.85	1.70	2.55
0.125	0.30	0.85	1.70	2.55
0.143	0.40	0.90	1.80	2.70
0.145	0.40	0.90	1.80	2.70
0.150	0.40	0.90	1.80	2.70
0.161	0.40	0.90	1.80	2.70
0.165	0.40	0.90	1.80	2.70
0.177	0.40	0.90	1.80	2.70
0.179	0.40	0.90	1.80	2.70
0.188	0.40	1.00	2.00	3.00
0.200	0.40	1.00	2.00	3.00
0.207	0.40	1.00	2.00	3.00

[a]—"Galvanized" coating applies to "Common" strand only.

[b]—Class A coating applies to all grades of strand.
Class A, "Extra Galvanized" and "Double Galvanized" are equivalent terms.

[c]—Class B and Class C coatings apply to all grades of strand.

TABLE II

Standard Coating Weights Galvanized Manufacturers' Wire

Gage	Single Galvanized	Intermediate Galvanized or Bethanized	Special Galvanized or Bethanized "A"	Bethanized "B" Coating	Bethanized "C" Coating
	Type 1	Type 2	Type 3		
Coarser than 6	.65 oz.	.75 oz.	.90 oz.	1.80 oz.	2.70 oz.
6	.50 oz.	.70 oz.	.90 oz.	1.80 oz.	2.70 oz.
7	.40 oz.	.60 oz.	.80 oz.	1.60 oz.	2.40 oz.
8	.40 oz.	.60 oz.	.80 oz.	1.60 oz.	2.40 oz.
9	.40 oz.	.60 oz.	.80 oz.	1.60 oz.	2.40 oz.
10	.30 oz.	.50 oz.	.80 oz.	1.60 oz.	2.40 oz.
11	.30 oz.	.50 oz.	.80 oz.	1.60 oz.	2.40 oz.
12	.30 oz.	.50 oz.	.80 oz.	1.60 oz.	2.40 oz.
13	.30 oz.	.50 oz.	.70 oz.	1.40 oz.	2.10 oz.
14	.25 oz.	.45 oz.	.65 oz.	1.30 oz.	1.95 oz.
15	.15 oz.	.35 oz.	.50 oz.	1.00 oz.	1.50 oz.
16	.15 oz.	.35 oz.	.50 oz.	1.00 oz.	1.50 oz.
17	.15 oz.	.30 oz.	.40 oz.	.80 oz.	1.20 oz.
18	.15 oz.	.30 oz.	.40 oz.	.80 oz.	1.20 oz.

steps in the process, Figure 1. It will be noted that the unit consists of two principal divisions. Broadly speaking, we have combined a chemical extraction plant with a plating plant.

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AS stated before, the source of zinc in the plating cells is a purified zinc sulphate solution. This solution is prepared in the leaching plant adjacent to the plating units.

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CALCINED zinc concentrate is brought into the leaching plant as a raw material. It is dissolved by free sulphuric acid present in the used plating solution, which is returned to the leaching plant from the plating cells, until the resulting solution is nearly neutral. The iron carried by the ore will precipitate from this approximately neutral solution, but this leaching process requires considerable skill in its execution in order to obtain satisfactory results. The substantial amount of iron that is precipitated in the leaching treatment of the calcine is in a form of a colloidal hydrate that is difficult to filter, and the filterability of which is sensitive to the conditions of its precipitation. The product of the leaching vats is filtered in a large rotating drum or Burt filter. By this means the hydrated iron precipitate, in which is entrapped some of the normal impurities, is separated and discarded. The resultant filtrate is a very concentrated zinc sulphate solution which contains small amounts of impurities not removed by the iron precipitation. By treating this neutral zinc sulphate filtrate with zinc dust, it is possible to remove practically all of the remaining copper, cadmium, antimony, etc., and thus provide the very pure neutral electrolyte as a means of introducing zinc into the electrolytic cells of the process.

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THUS, it is apparent that the Bethanizing process comprises two distinct operations in parallel, one for the continuous regeneration of the electro-plating solution and the other for the treat-

ment and processing of the wire being plated. By judicious adjustment of the concentrations of the several solutions involved, it is possible to operate the system without alteration of the total solution volume employed.

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BEFORE the application of the electrolytic zinc coating, the wire is generally annealed and cleaned. The flow-sheet indicates the annealing step employed for the production of soft zinc coated wire. If it should be desirable not to soften the wire to the point of conventional soft galvanized wire, the lead annealing may be bypassed. Thus, we have available a wider range of tempers of the finished wire than we were previously able to realize with our hot galvanizing units. A particular development in this process is the practically simultaneous lead annealing and caustic cleaning operations by passing the wire through molten lead on which lies a covering bath of molten caustic soda. By a suitable arrangement of electrodes the wire is made cathodic in this caustic cell so that nascent sodium is discharged on the wire and a perfect cleaning and oxide reduction operation is performed.

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FROM this annealing and cleaning unit the wire travels through a rinse into an acid solution where again it is treated electrolytically; this time, however, the wire is made the anode. By means of these two treatments, the surface of the wire is perfectly clean and prepared to take a tightly adherent coating of electrolytic zinc.

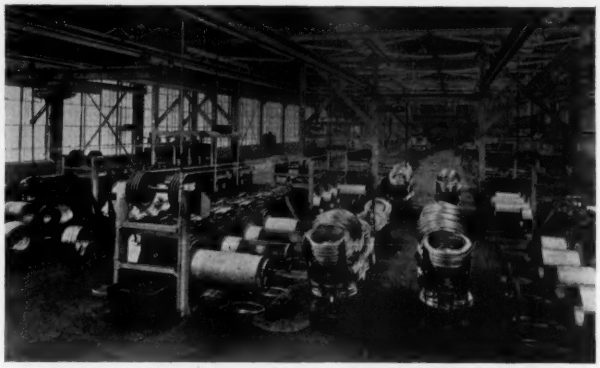

Figure 10. Take Up Frames Bethanizing Units. These take up blocks are equipped with variable speed control in order to provide the speed required for a given coating weight. ✦ ✦ ✦ ✦

✦ ✦ ✦

FROM the anodic treatment cell the wire passes immediately into the plating cell. The electrolyte in the plating cell is a very high acid solution characterized by high electrochemical efficiency at high current densities. Current densities of the order of 1,000 amperes per square foot are employed. The resultant electrolytic zinc coating that is formed has a uniform structure which might be characterized as continuous from the surface of the steel to the outer surface of the coating. In order to show the character of the structure of this zinc coating, we show in Figure 2, at 500 diameter magnification, the structure of a 3 oz. coating. The etchant employed was **Palmerton No. 1** reagent. As sometimes happens, in order to bring out the structure of the coating in the photomicrograph, the steel base at the junction are somewhat out of focus; the photograph was so taken in order to bring out sharply the orientations in the zinc structure.

✦ ✦ ✦

IN Figure 3, is shown an unetched section at 500 diameters to illustrate the bond between the zinc and the steel base. It is interesting to note how intimately the zinc has been deposited into the microscopic irregularities of the surface. The appearance of the zinc is the result of the polish attack of the dry polishing method and the instantaneous oxidation of the polished zinc surface which shows up very distinctly at these very high magnifications. This coating is a 3 oz. coating on 0.192" diameter wire.

✦ ✦ ✦

AS stated before, insoluble anodes are used in this process and for this purpose a special alloy of silver and lead has been found to be most effective. Numerous contactors on the wire provide a means for introducing

(*Please turn to Page 712*)

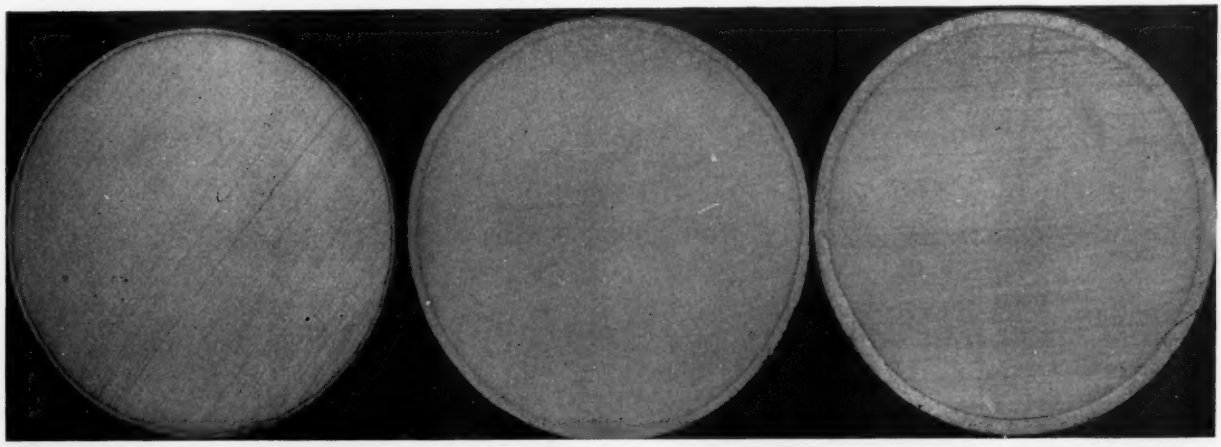

Figure 11. Unetched Section of Bethanized Wire. No. 12 gauge wire with 0.82 oz. coating weight. Magnification 25 diameters. ✦ ✦

Figure 12. Unetched Section of Bethanized Wire. No. 12 gauge wire with 1.66 oz. coating weight. Magnification 25 diameters. ✦ ✦

Figure 13. Unetched Section of Bethanized Wire. No. 12 gauge wire with 2.51 oz. coating weight. Magnification 25 diameters. ✦ ✦

"THE MACHINES THAT PUT THE 'RINGS' IN SPRINGS"

30-150
SPRINGS
per minute
(according to drive)

No. 1½

Universal Spring Coiler

SEGMENT TYPE

56" Model - Series 676

Wire Sizes No. 20 (.031") to No. 11 (.120")

30-150
SPRINGS
per minute
(according to drive)

Patent 2,175,426

DISTINCTIVE FEATURES

- Pitch and Diameter Cams and Compound Levers are accessibly located in the recess at front.
- Auxiliary Gearing to double the wire feed on sizes up to No. 15 (.072")
- Ball Bearing construction throughout on all rotating shafts.
- Individual Pressure Clutch on each pair of Feed Rolls.
- Individual Simple Adjustment for Cutter Alignment, easily adjusted from upper to lower cutter thereby providing direct pull.
- Morse Free Wheeling Clutch for high accuracy of feed
- Wear-free Diameter Slide Connection

Door to recess left open to show accessibility to Cam Controls, Compound Blocks and Cams.
A ratchet crankhandle, used for set-up purposes, is removable.

SLEEPER & HARTLEY, INC.

DESIGNERS AND BUILDERS

WORCESTER, MASSACHUSETTS, U. S. A.

The Navy's Share of the Job

By Rear Admiral Wat Tyler Cluverius,
President, Worcester Polytechnic Institute, Worcester, Mass.
U. S. Navy, Ret.

An address delivered before the "National Defense" Luncheon of the Wire Association at Philadelphia, Pa., October 21st, 1941.

WHEN, in a race under sail, the boom is hauled flat aft so as to catch every ounce of the breeze, and a turn is taken with the sheet, the skipper sings out, "Hold everything!" That's the job for every American today.

✦ ✦ ✦

JUST as the yachtsman makes his gear secure, so must we in order to keep that which is ours.

✦ ✦ ✦

CALVIN COOLIDGE, when President of the United States, once said:

"If we are to heed the admonition to put first things first, a very little deliberation would reveal to us that one of the main essentials, which lies at the very beginning of civilization, is that of security. It is only when people can feel that their lives and the property which their industry has produced today will continue to be safe on the morrow that there can be that stability of value and that economic progress upon which human dependence has always rested."

✦ ✦ ✦

ANOTHER president, **Herbert Hoover,** has said:

"The national defense is the first and most solemn obligation placed upon the Federal Government by the Constitution."

In fact, every president since **Washington** has been concerned with the safety of the nation; every president has prayed that his might be an administration of peace. And we know with what result in our brief national existence.

✦ ✦ ✦

FEW Americans are there today who would take issue with the arming for our defense, costly as it is. None now are asking why was not the peace of 1918 maintained—a peace to which we contributed so generously — and so dearly — of our sons and our treasure. Everyone, today, sees clearly about us the breakdown of our vaunted civilization. Terror in every land overseas and the free peoples of the globe are being destroyed by ruthless tyrants who would plunge the world again into the barbarism of the dark ages, and worse.

✦ ✦ ✦

ACROSS the Atlantic, no longer a barrier of defense, dictators are annihilating millions throughout the continent, free men in defense of their freedom and their homes. Whole populations are being enslaved so that they may produce; helpless women and innocent children, murdered if they cannot produce.

✦ ✦ ✦

ACROSS the Pacific, a partner to this carnage — a yellow race—is exterminating the other races of the Orient: a nation whose curtain we lifted to civilization now engaged in a terrible drama of destruction. In between, ourselves, a people who struggled for our priceless freedom and with it made a nation which has been the envy of the world. Yes, a nation now marked for eventual destruction, too.

REAR ADMIRAL WAT TYLER CLUVERIUS
U. S. Navy (Ret.) (Now Recalled to Active Duty)
President, Worcester Polytechnic Institute, Worcester, Mass.

Awarded Distinguished Service Medal, Decorations —Officer of the Order of Leopold, Belgium; Grand Officer, Crown of Italy; Commander, Order of St. Olaf, Norway; Officer Legion of Honor, France. Also U. S. Service Decorations for West Indian Campaign, 1898; Philippine Campaign, 1899; Mexican Service and the Victory Medal — Mine Laying Clasp.

✦ ✦ ✦

WELL, what are we to do? I know what the Navy will do when the call is made. I know what is to be its share of the job that confronts us.

✦ ✦ ✦

REMEMBER that a nation had its beginnings in a group gathered together for self-protection: those of one blood and similar interests. These groups grew and eventually came in contact with similar groups of other ties and rights. Friction arose, as friction always does with contacts; smoke was generated. Despite all the peaceful efforts to remove the cause, flame most often resulted, and that was war. Then, and not until then, were the means that nations maintain to put out this fire called into action: the army and navy of the nation.

✦ ✦ ✦

HOW often have all overtures of arbitration failed; how many times have the good offices of America been spurned. How futile have been treaties of peace. Inevitably, weakness in free and independent nations means war.

✦ ✦ ✦

TODAY, the flames are everywhere about us. Let us consider, then, the Navy's share in the job in fighting them.

✦ ✦ ✦

A MARITIME nation is the only type which history shows to survive and to exert lasting influence in the world. A maritime nation expresses its sovereignty

in its seapower. **Roger Bacon** said:

"He that controls the sea rules the world."

The Second Continental Congress, assembled in Philadelphia in 1777, said that

"Nothing is more evident than that America has the means and must in time become the first maritime power in the world."

✦ ✦ ✦

WE have an example, too, in another great maritime nation now valiantly and desperately fighting for her sovereignty.

✦ ✦ ✦

NO matter if the dictators subjugate a continent, there they will stay unless and until they control the sea. Never can peaceful conditions, and prosperity accrue in that case; never at best, to a polyglot nation over which would fly the pin-wheel swastika flag.

✦ ✦ ✦

BUT should they gain control of the sea, what then?

✦ ✦ ✦

TOO few understand the importance of the factor of the seaborne commerce of the world in the survival of nations. **Pericles**, a great philosopher and leader, said centuries ago:

"That nation which loses control of the sea and its ability to carry its merchandise thereon, its name is writ in water."

What would be our fate, for trade is the life-blood of man's activities?

✦ ✦ ✦

THE most important of the elements of seapower is the merchant fleet wherewith trade is carried on. Behind that fleet is the navy, the second of the three essentials, the remaining being the bases wherein are replenished both the naval ships and the merchantmen. The fundamental policy of the Navy requires that the Fleet be maintained in sufficient strength to support the policies and the commerce of the United States and to guard its continental and overseas possessions — a defensive policy as are all our other national policies.

✦ ✦ ✦

THE Navy's principal function is a war function for which it is now making ready to perform in accord with the instructions of the Federal Government expressed through your representatives in Congress assembled.

✦ ✦ ✦

IN carrying out the basic policy, the actual mission of the Fleet must be defined. Primarily it is security we seek, both for our continental domain and in all the possessions under our flag—a flag that thus must cover all Americans.

✦ ✦ ✦

THE size of the Fleet is predicated on the character and extent of the national policy which now encompasses all American interests throughout the world, for they are being seriously endangered.

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GIVEN the mission, the Navy makes its plans. One covers, for instance, possible aggression in the broad Pacific wherein have been our chiefest national interests since the first World War —its waters wash our shores north, south, east and west. Another plan covers the Atlantic. With the building of the Panama Canal, we could move the Fleet into either ocean in order to make effective the plan of action therein. But, today, both plans—all plans—are simultaneously active in the wide world upheaval and we are doubling the Fleet, and more —a two-ocean Navy it is called.

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MUCH of the instant demand is a cordon of ships round about the continent from Iceland to Alaska. The bulwarks of our defense are on the job, come wind come weather. Daily new units are joining the Fleet and production is proceeding in generally satisfactory manner. In the building yards of the Naval Establishment morale, enthusiasm and accomplishment are at high stage.

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YOU here in Philadelphia know that you have a yard of the first order, capable of ready expansion in shipways and dry docks, and a labor market unexcelled in the nation. It was my privilege to command that fine station with its loyal and efficient personnel. In the waters of this port, the first American squadron was formed to fight for the independence that was declared here.

WE earnestly trust that this spirit is permeating all the private shipbuilding yards similarly charged with the same vital duties as are those of the Navy.

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A FEW weeks ago I witnessed the launching of the powerful **MASSACHUSETTS**, the newest battleship. She is seven months ahead of schedule. In the active Navy duty to which I have been recalled, I visited huge industrial plants converted most expeditiously from making printing presses, lathes, planers, automobile bodies, to the production of guns and armaments: all months ahead of promised dates. These are notable examples of men in dungarees meeting, in outstanding manner, their responsibilities of American citizens.

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THE response, then, in so far as the Fleet is concerned, is splendid but results are reported to be not so good elsewhere. Why?

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MEN everywhere want to work: they are anxious to do their share. Nothing, absolutely nothing must stand in the way. Otherwise, we may be lost and, with us, the gifts that made us free: free to labor, free to enjoy the fruits of that labor, free to do our share of the world's work, and thank God for the privilege that is ours. There is yet much to be done.

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BUT men, not ships, fight. The Navy's personnel is being rapidly expanded: everywhere men are joining The Service Afloat. Our brother service ashore has a big job building up from almost nothing. Ours is one of expansion for which we had eventually planned. We do know what we want and have been able to keep abreast every changing naval science.

✦ ✦ ✦

INTO our training stations youth is pouring. Discipline begins at once—it is sorely needed in this democratic land. But it is the discipline of the willing follower,—the word is from the same root as disciple. Blind obedience will not do for any American. He must know what is to be achieved and

(*Please turn to Page 719*)

America Above All

By F. A. Westphal,
Superintendent of Wire Mills,
Sheffield Steel Corp., Kansas City, Mo.
— and —
Past President, The Wire Association

The text of an address delivered before The Wire Association at Philadelphia, Penna., Monday, October 20th, 1941. ✦

FRANKLY, I find it diffifult at this time to choose statements appropriate for these rapidly shifting events of today. After careful thought and consideration, and with your forebearance, I shall present to you for reemphasis subjects that are a part of the historical proceedings of the Wire Association and that we have previously discussed and witnessed together in these immediate past years. They are by their very nature technical, economical and patriotic. At this point, as well, I shall try to state for your consideration thoughts for the present and the future.

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FIRST—let us reconsider technically a few red hot developments since 1937. Starting with billet and rod mills, we find the 600 to 900 pound bundles of rods are with us today. By the development of butt welders coils of rods up to 2000 pounds are in some places feasible. Why stop at this figure throughout the wire industry? In the acid cleaning house, the pioneering of straight-line acid cleaning by **Frank H. Nullmeyer** was fully established in 1927; the old fashioned baker is out-moded by the invention of the flash baker. Materials of construction for acid cleaning tubs for both sulphuric and hydrochloric acid are another excellent contribution to the arts and sciences of the industry.

✦ ✦ ✦

LET us pay tribute to the pioneering of **Connor** of England for continuous wire drawing of coarse sizes from rod for both high and low carbon wire; and also to **George A. Paff** for his pioneering on the individual motor driven wire block.

ONE of the greatest contributions for all time is the progressive development of Tungsten-Carbide dies from Germany in the 1920's. This in itself made possible greater, more enduring and simpler machine design, faster speeds in drawing, heavier increment loads and size bundles, better quality and finish, and lower conversion costs. Material handling for heavier loads and construction of systematic plant layouts combined with improvements in conveyors, cranes and tractors present interesting engineering for the present and future for the metals and wire industry. Underlying, however, all this decided progress in mechanical and electrical developments, let us realize that hardly any of this would be possible without the vast improvements made by our steel makers and rollers, who have combined their talents with our research departments and with their chemists, metallurgists and metallographers. Finally, the engineers have done the actual planning and construction, but always the operating man has been on the actual firing line of industry getting the finished p r o d u c t s , conversion costs, yields and ultimate results out for his sales department to place in our trade channels.

FREDERICK A. WESTPHAL
Superintendent of Wire Mills,
Sheffield Steel Corp., Kansas City, Mo.
Past President, The Wire Association

Born Holyoke, Mass., 1895. Educated U. S. Naval Academy. Four years with American Steel & Wire Co. In 1922 Assistant Superintendent Rod and Wire Works, Jones & Laughlin Steel Corp., Aliquippa, Pa. In 1928 Superintendent of Wire Mills, Sheffield Steel Corp., Kansas City, Mo. During World War served as Officer Sixth Field Artillery — severely wounded in action — twice cited and decorated for gallantry in action and meritorious services.

✦ ✦ ✦

SECOND—repeatedly you have heard me say that we, meaning industry, cannot afford to get on a perch and be too proud of our status and progress. What we think is the last word in achievement today, the future may throw into complete discard. I think of what severe competition we shall all face after world hostilities cease. Greater capacities will be diverted from armaments to commercial channels; markets will be loaded with all products; foreign competition with possible advantageous rates of exchange combined with lower wages per man hour with consequent lower living standards, it all can flood our trade channels. Saturation points for commodities can be too quickly approached and unless it be stopped, the sales departments of industry will leap at one another's throats for tonnage in the offing with consequent sufferings on the P & L sheets.

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TECHNOLOGICALLY and economically we have ponderous problems ahead for all of us, and

by cooperative action and forethought we Americans must crystallize to action, as it is going to be a matter of the survival of the fittest.

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THIRD—at our Pittsburgh Regional Meeting in May, 1937, I gave you the following prepared statement, and allow me to reemphasize it to you today. I quote:-

"Our forefathers may have suffered, sacrificed and witnessed the striking of labor to its knees occasionally, but in spite of it all they built this country as FREE MEN. Within our time we have realized the abolition of the 12 hour shift, vast improvements in safety and welfare conditions, and the firm establishment and recognition of collective bargaining of employees. Progress has been made up to this time in human relations to the extent that fair play can be assured, otherwise the guilty, whether it be employer or employee, will surely have his "chickens come home to roost" on him some day.

The spirit of today indicates that the pendulum is swinging too far over for labor. Employees and workers amongst themselves are using coercion and intimidation, and are forcing their fellow workers into organizations they do not want to belong to. Some workers feel that they are not free men, but must line up with those who demand the payment of tribute.

Any man has those rights that we and our forefathers fought and bled for, namely freedom. The mental life of today is propaganda, and the weaker, less intellectual and dumber are being misled by a lot of sour-pussed propagandists. It looks very much like labor shall awaken in the not too far distant future and realize they have been stupidly misled.

There is an old fashioned word, namely loyalty. If we stop to analyze that word, we shall realize that the strength of loyalty lies only with strong character and strong men because they choose the better things before they will establish their unwavering loyalty.

Let us not be cynical, but face the spirit of today and try to lead our fellow workers with that sense of loyalty to his fellow worker, his righteous and fair minded employer — and finally, loyalty to his home, country and God."

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GENTLEMEN, as I meditated over this statement just recently, it occurred to me that we all thought we would have had a better break in 1937 coming our way in regards to labor. Instead we have the organization of politically powerful labor leaders backed by sour politics throughout the nation, it means the "piper must be paid" some day. The people to suffer are not those who receive the tribute from the laboring man, but instead the individual man and his family who may be a fellow member of your community, church or legion. You and I are bending our efforts in our best ways to stem this tide, but it seems of no avail. I am apprehensive that a corrective readjustment must follow only after a chaotic and economic storm. It is my hope that this great country of ours be spared too severe a price, and that it will not be too lengthy in the element of time for us Americans to become steadfast and stable. We must guard against bureaucracy overlording democracy at this very moment, because the democratic way of life is our cherished life today.

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FOURTH—so that my attitude can be immediately and correctly ascertained and that I may be understood crystal clear, I refer you to page 208 of Wire & Wire Products, April, 1938, in which was published my radio address for the American Legion in March, 1938, over radio station WHB of Kansas City, Missouri. I spoke on "The Problem of Employment of Men Over 40", and in that address I said—I quote "Today this world is a turmoil of insidiousness—Communism of Russia, Nazism of Germany, Fascism of Italy and a crazy radicalism by some in America!" I still stand unequivocally today, October, 1941, on the same statement.

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THIS **Wire Association** has led all technical societies in America on preparedness. Plot our course from 1932 when the **Assistant Secretary of War, F. H. Payne,** gave recognition of our efforts on industrial mobilization. **Colonel Louis Johnson, Assistant Secretary of War,** that dynamic and indefatigable worker with a fine war record, gave his first address on **Industrial Mobilization** at Detroit at the annual Wire Convention exactly three years ago. No one paid any attention to him at that time, and later he was released from his duties and had hung on him a political can.

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BEFORE this world was astounded by the outbreak of war in Europe on September 1st, 1939, or a shot had been fired in this Second World War, again we slugged at our Pittsburgh Regional Meeting in May, 1939. **We felt this war was unquestionably inevitable!** Herewith is another prepared and published quotation:-

"In furtherance of this patriotic subject, may I express the hope that our government will be wise and understanding and take a balanced perspective, and not allow us to be led blindly or dumbly into war without an absolute just cause. As one who experienced and witnessed the horrors of war, may I say that war is truly horrible, and with no nation apparently the winner. I do say, however, for the protection of our homes, country and trade channels that we must be cognizant of industrial mobilization in time of war, and that we should back up this administration or any future administration on a complete and effective program of Military and Naval preparedness."

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WHEN that statement became a part of the historical proceedings of the **Wire Association,** we never dreamed of a third term and we had not yet heard of **Wendell Willkie.** It can never be denied that we did not know what was coming; we felt the pulse of world affairs and understood and we had pleaded for industrial mobilization through the immediate preceding years.

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HERE again you will recall our 1940 Pittsburgh Regional Meeting at which time this Wire Association hurled the challenge **"America Must Be Ready."** In furtherance of that challenge I reaffirm to you all most emphatically and with all at my command just what was stated at that time, but with the following modifications:-

With the element of TIME most paramount,

(1) Build—correctly.

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(2) Prepare—correctly.

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(3) Be on the alert for espionage and sabotage, but by all means check the ranks of politically powerful labor leaders that are blocking our progress on national defense. It is utterly criminal, treasonable and seditious the losses they are directly responsible for. Furthermore, it is most revolting and repugnant to the citizenry and the home-loving laboring man himself. If the national administration continues to protect them and let them get away with everything up to murder, they are blocking national unity of purpose to maintain

(*Please turn to Page 717*)

Wire Drawing Lubricant Circulating Systems

By Robert C. Williams,
Chief Chemist,
The Ironsides Co., Columbus, O.

A satisfactory lubricant circulating system adapted to the particular requirements of an individual plant will produce freer drawing, reduce pickle acid contamination and reduce costs. ✦ ✦ ✦ ✦

Introduction

WIRE drawing machines have been the object of intensive engineering research, particularly during the past 10 to 15 years. Lubrication systems to serve these splendid "wet" drawing machines haven't received the attention due them. Generally speaking, little attempt has been made to thoroughly study what is needed to accomplish a good job of handling wire drawing lubricant solutions or emulsions. Sometimes, after the installation of the machines, they look around to find a vacant corner or a hole in the cellar to put that old tank to be used as a lubricant reservoir.

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PERHAPS no two mills should have the same system set up, since the drawing jobs done in different mills vary considerably. However, there ought to be some common denominator of successful handling of the lubricants.

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THERE certainly should be some minima and maxima regarding the size of reservoirs and pumps, to do the jobs. The advisability or necessity of providing means for heating and cooling the lubricant should be considered, as well as the size of pipes or troughs. The arrangement or necessity of baffles to facilitate the settling of metallic particles and sludge requires attention. The use of idle settling tanks, filters or centrifuges, the location of the pump and return pipe should be considered.

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Behavior of the Lubricant

BEFORE considering the above and other items, we ought to become acquainted with some things that go on in a lubricant solution during use.

THE conventional wire drawing lubricant is generally an emulsion or dispersion of fats or oils, stabilized by an emulsifying agent, commonly soap. When the working solution is freshly made up, the free fatty acid content is at a minimum. Free fatty acid is produced by hydrolysis of the soap immediately, and more slowly by hydrolysis of the fat and fatty oils, if present. A moderate amount of fatty acid is very desirable for lubrication as shown by previous work(1). If the fatty acid is reduced beyond a critical point by the addition of alkali, lubrication fails even in the presence of fat and oils.

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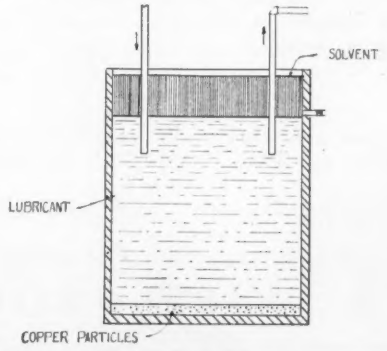
AS a working solution gets older, the free fatty acid content increases more rapidly than it is carried away as a lubricant film. This free fatty acid reacts with abraded copper dust (really copper oxide) on the surface of the copper particles, producing copper soap, which gives the greenish cast to the working solution, and ultimately results in copper soap sludge, which, in turn, entangles copper particles.

(1) **Reference at end of article.**



✦ ✦ ✦

DURING this time, the pH of the solution drops, due in part to traces of pickle left on the rods. No acid contamination would take place in a fine wire system, due to neutralization by the alkaline solution in the rod machine. Carbon dioxide from the air is a large factor in the reduction of pH, since the alkaline solution absorbs it readily and forms carbonates or bicarbonates having lower alkalinities (pH values).

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IN an effort to reduce pickle acid contamination from the rods, the following proceedings are successful. After the final hose wash of pickled rods, dipping in a tank of hot dilute soda ash positively neutralizes all traces of acid. The expense is slight, as soda ash is cheap, and all that is needed is enough to give a definite alkaline reaction at all times. This can be checked periodically by operators using litmus paper. The soda ash solution should be renewed after experience shows too great an accumulation of sodium sulfate.

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GETTING back to the copper soap question, it is responsible, if present in considerable quantity, for gummy carriers and dies, because it is essentially insoluble in water and copper dust hangs onto it readily. Sweetening the solution, by adding fresh compound as required, relieves the situation considerably by improved detergent action, and by raising the pH, which reduces the free fatty acid content.

HIGH pH of a working solution, produced by adding alkali, reduces the copper soap and free fatty acid contents, and causes copper dust to remain in suspension better. This would be desirable where centrifuges are used, in order to carry the dust to the centrifuges. Obviously, if the copper dust settles out in the machines, troughs and tanks, it will not be recovered in the centrifuge.

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Laboratory Control

ORDINARILY, the laboratory control tests of working solutions are limited to the Babcock test, which gives the total soap and fat or oil percentage, and the pH test. In some mills, the soap percentage is obtained by titration of the solution with acid. In an old solution, soap percentages obtained by simple titration are questionable, due to carbonate accumulation, and more elaborate means are necessary to obtain true values.

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THE pH tests along with Babcock tests are useful in determining whether dangerously low alkalinity is being reached. Ordinarily, the periodic additions of compound take care of keeping the pH from getting too low. The pH range of 8.5 to 10.0 appears to be satisfactory in most cases. Still higher pH values (10 to 11) appear to permit good lubrication, but roll or carrier pitting may be initiated, depending on conditions.

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Handling the Lubricant

TO properly handle wire drawing lubricant solutions, there are some principles which can be laid down presumably without argument, while others are open to question.

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1. The lubricant reservoir, obviously, must be of sufficient size to supply all machines and leave sufficient volume in the reservoir for heat absorption, if cooling coils are not provided. For best results, the temperature of a rod machine lubricant should not exceed 140°F, and preferably operate between 110°F. and 130°F. For fine wire, the lubricant should not exceed 120°F.

2. The reservoir should be of such size and should at all times have sufficient volume to permit the use of vertical baffles. The rate of flow around the baffles should be slow enough to permit settling of dust and sludge. (Sludge which is sufficiently aerated or foamed will float). The rate of flow, of course, depends on a number of factors, including the ratio of lubricant in the machines and lines to that in the reservoir, the number, size and location of the baffles, turbulence produced by the return or by the by-passed solution from the pumps.

3. One or more large opening valves on the bottom of the reservoir are desirable for clean-out purposes.

4. The return line from the machines should be projected beneath the surface of the lubricant in the reservoir to reduce objectionable foaming.

5. Heating coils are advisable to bring up the temperature of the lubricant to the best operating range, after a shutdown, in cold weather.

6. A duplicate reservoir has been found useful, not only to continue operations during a clean-out of one reservoir, but to be used alternately, permitting the dust and sludge in one system to settle out, while the other is in use.

7. Centrifuges are useful if a reasonable proportion of the circulating lubricant can be handled, and if the copper particles are held in suspension, instead of being deposited everywhere. Higher pH favors the suspension of copper particles.

8. Filters to remove copper particles, sludge and dirt appear to be beneficial, but require rather frequent servicing.

9. Tanks for boiling up compound, preparatory to making up fresh solution, are essential. Ordinarily, a steel drum of 55 or 110 gal. capacity, will suffice. A steam hose will provide heat and agitation, though a clamped-on high speed stirrer speeds up the process of making the concentrated smooth solu-

(Please turn to Page 724)

ANNOUNCING A SPECIAL ISSUE FOR JANUARY, 1942

— SPECIAL BECAUSE —

The discussions on technical papers at the annual meeting of the WIRE ASSOCIATION will be published in their entirety in the regular January issue of WIRE and WIRE PRODUCTS.

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The Directors of the WIRE ASSOCIATION have approved this plan to provide these discussions to all subscribers without extra expenditure.

✦ ✦ ✦

— SPECIAL BECAUSE —

THE MORDICA MEMORIAL LECTURE FOR 1941

BY KENNETH B. LEWIS
Consulting Wire Mill Engineer
On the Subject

"THE SHAPE OF THINGS TO COME"

Together With a Research Paper

BY B. L. McCARTHY,
Chief Metallurgist, Wickwire Spencer Steel Co.

"THE SCIENTIFIC ASPECTS OF STEEL WIRE MANUFACTURE"
WILL ALSO BE PUBLISHED IN THIS ISSUE.

— TO OUR ADVERTISERS —

The advertising value of this special arrangement to be followed in the January issue of WIRE and WIRE PRODUCTS is obvious.

✦ ✦ ✦

Revised rate card will apply to this issue — Closing date, December 20th, 1941.

✦ ✦ ✦

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National Defense Features Wire Association Convention

National Defense Features Wire Association Convention

THE theme of the **Annual Wire Association Convention** held at Philadelphia, Pa., October 20th to 24th inclusive, was **"National Unity and National Defense."**

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THE opening address entitled **"America Above All"** was delivered on Monday by **F. A. Westphal,** Superintendent of Wire Mills, Sheffield Steel Corp., Kansas City, Mo., Past President of the Wire Association, and can be found on Page 679 of this issue of WIRE & WIRE PRODUCTS.

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THE Annual Luncheon this year was featured by four speakers of national reputation representing Industry, The Army, The Navy Department and the Government. **Brigadier General John W. N. Schulz,** Director of Purchases and Contracts, Office of the Under Secretary of War, spoke on **"War Department Procurement in the Emergency."** In discussing Army procurement problems, **General Schulz** revealed that the War Department has purchased more than 300,000 miles of field telephone wire for the Army and that enormous quantities of this wire still remain to be procured. **General Schulz'** address will be published in the December Issue of WIRE & WIRE PRODUCTS.

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REAR Admiral Wat Tyler **Cluverius,** U. S. Navy, Ret., (recently recalled to active service) now President of the Worcester Polytechnic Institute, Worcester, Mass., spoke on **"The Navy's Share of the Job."** This address will be found on Page 695 of the current issue of WIRE & WIRE PRODUCTS.

Medal Award for 1941 to C. W. Garrett, Wire Mill Metallurgist, Jones and Laughlin Steel Corp. Honorable Mention to Rodman R. Tatnall, Metallurgist, Morgan Works, Wickwire Spencer Steel Co. ✦ ✦ ✦ ✦ ✦

AN address was delivered by **Dr. Charles I. Gragg,** Associate Professor of Marketing, Harvard Graduate School of Business Administration and now Consultant to **Donald M. Nelson,** Director of Priorities, Office of Production Management, who directed attention to the fact that only ten billion dollars of the sixty billion dollars appropriated has so far been spent on the defense program. Dr. Gragg's address will be published in full in the December Issue of WIRE & WIRE PRODUCTS.

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SPEAKING for Industry, **Dr. A. A. Stockdale,** representing the **National Association of Manufacturers** was most inspiring. He emphasized that this country has achieved the highest standard of living in the world under our form of Government and pointed out that with only 7% of the world's population we have greater production facilities and capacity than all the other nations of the world, that what to us are common-place things in our ordinary living are luxuries in all other countries, and further that the American standard of living is one which has never been approached under any other form of Government. Dr. Stockdale pointed out that this was all due to the system of free enterprise and the so-called capitalistic system under which we have developed the economy of America and emphasized that our ability to retain Freedom in this country was based on a continuation of our present form of society. A digest of Dr. Stockdale's address will be published in the December issue of WIRE & WIRE PRODUCTS. At the meeting he spoke extemporaneously and was voted to be the most exceptional inspirational speaker those present had ever heard.

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Winner of the 1941 Medal Award

C. W. GARRETT

Graduated Michigan College of Mining and Technology, B.S. Ferrous Metallurgy, 1932; Master's Degree, 1933; Instructor, 1934-35. Then successively Ford Motor Co. Metallurgical Laboratory, Cuyahoga Works of American Steel & Wire Co., and Jones & Laughlin Steel Corp., as welding Wire Investigator. In 1938 became Wire Mill Metallurgist of Aliquippa Works. Member of American Society for Metals, American Institute of Mining and Metallurgical Engineers and The Wire Association.

The Technical Sessions

THE papers presented at the Technical Sessions were interesting and informative and considerable discussion ensued at the various sessions.

The Medal Award

THE Annual Medal Award for the "most meritorious paper on wire manufacture or fabrication during the year by a member of the Wire Association" was made to **C. W. Garrett,** Wire Mill Metallurgist, Aliquippa Works, **Jones & Laughlin Steel Corp.,** Aliquippa, Pa., whose paper was entitled **"A Brief Discussion on the Manufacture of Steel for Arc Welding Electrodes." Mr. Garrett's** paper outlined certain features of major importance on the manufacture of steel for arc welding electrodes. He included a study of chemical analysis, steel making practices, heating and rolling technique, the preparation of the rod for drawing, the wire drawing procedures and the testing procedures to be followed. The paper was published in full in the October Issue of WIRE & WIRE PRODUCTS.

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ONLY one **"Honorable Mention"** was given this year. This was to **Rodman R. Tatnall,** Metallurgical Engineer, Morgan Works, Wickwire Spencer Steel Company, Worcester, Mass. The paper was entitled **"Time, Temperature and Size in the Heating of Steel Wire"** and was a study of the elements bearing on the absorption of the heat by the wire. **Mr. Tatnall's** conclusion is that this is a fundamental factor which determines not only the success of the operation but also the designs for equipment and the specifications for processing. This paper was published in full in the October 1941 issue of WIRE & WIRE PRODUCTS.

Honorable Mention Award For 1941

RODMAN R. TATNALL

Born in New Rochelle, N. Y., in 1906. Educated at Worcester Polytechnic Institute. First employment one year in Development Dept. of Waltham Watch Co. In 1928, joined Wickwire Spencer Steel Co. in spring production dept. In 1930, was promoted to position of Metallurgical Engineer, and since then has been in charge of experiment and research on spring and spring materials. Member of Wire Association and American Society for Metals.

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ANOTHER paper which created a great deal of interest was that by **Kenneth S. Wyatt,** Cable Engineer, Phelps Dodge Copper Products Corporation who presented a paper on the subject **"The Cable Industry in National Defense." Mr. Wyatt** outlined many of the various changes which have taken place in the cable industry during the emergency and empha-

(*Please turn to Page 716*)

New "Nopco 99" Soaps

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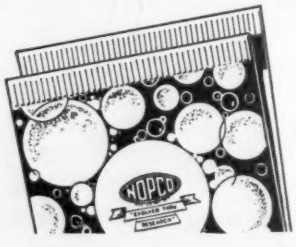
Also get full information on Nopco Wet Drawing Compounds for copper, brass and bronze wire, copper and brass tubes and shells, and steel wire.



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STATISTICS --- AUGUST, 1941

PRODUCTION FOR SALE OF IRON AND STEEL PRODUCTS

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

August - 1941
PERIOD

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons							
					Current Month				Year to Date			
					Total	Per cent of capacity	Shipments		Total	Per Cent of capacity	Shipments	
							Export	To members of the industry for conversion into further finished products			Export	To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	38	1	xxxxxxx	670,638	xxx	251,026	169,149	4,292,092	xxx	1,108,639	1,375,044
	Heavy structural shapes	9	2	5,126,200	390,888	89.8	11,443	xxxxxxx	3,057,942	89.6	122,682	xxxxxxx
	Steel piling	4	3	422,000	34,062	95.0	4,422	xxxxxxx	238,645	84.9	22,378	xxxxxxx
	Plates—Sheared and Universal	21	4	6,323,370	535,693	99.7	17,378	4,102	3,759,137	89.3	230,637	23,950
	Skelp	8	5	xxxxxxx	78,219	xxx	11,808	33,343	689,334	xxx	114,120	284,270
	Rails—Standard (over 60 lbs.)	4	6	3,613,600	132,360	43.1	3,110	xxxxxxx	1,200,754	49.9	48,826	xxxxxxx
	Light (60 lbs. and under)	6	7	302,800	11,276	43.8	5,266	xxxxxxx	117,880	58.5	44,512	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	2,161	24.9	424	xxxxxxx	18,080	26.6	2,475	xxxxxxx
	Splice bar and tie plates	15	9	1,300,200	54,192	49.1	347	xxxxxxx	496,751	57.4	10,917	xxxxxxx
	Bars—Merchant	40	10	xxxxxxx	505,263	xxx	25,637	57,942	4,259,351	xxx	327,823	513,202
	Concrete reinforcing—New billet	17	11	xxxxxxx	148,517	xxx	15,726	xxxxxxx	995,343	xxx	138,579	xxxxxxx
	Rerolling	19	12	xxxxxxx	22,369	xxx	1,783	xxxxxxx	144,483	xxx	10,199	xxxxxxx
	Cold finished—Carbon	22	13	xxxxxxx	103,236	xxx	2,099	xxxxxxx	832,066	xxx	15,959	xxxxxxx
	Alloy—Hot rolled	19	14	xxxxxxx	150,531	xxx	4,073	21,408	1,278,483	xxx	110,700	189,376
	Cold finished	17	15	xxxxxxx	16,866	xxx	1,649	xxxxxxx	122,503	xxx	21,842	xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	13,910	xxx	398	xxxxxxx	79,573	xxx	2,738	xxxxxxx
	TOTAL BARS	61	17	12,724,365	960,692	88.9	51,365	79,350	7,711,802	91.0	627,840	702,578
	Tool steel bars (rolled and forged)	17	18	164,895	13,772	98.3	666	xxxxxxx	97,376	88.7	5,222	xxxxxxx
	Pipe and tube—B. W.	14	19	2,109,200	153,015	85.4	8,390	xxxxxxx	1,091,734	77.7	81,247	xxxxxxx
	L. W.	8	20	885,260	46,895	62.4	2,026	xxxxxxx	331,951	56.3	21,150	xxxxxxx
	Electric weld	5	21	491,020	48,907	117.2	991	xxxxxxx	335,020	102.5	14,233	xxxxxxx
	Seamless	13	22	2,963,690	192,776	76.6	14,069	xxxxxxx	1,412,004	71.5	132,277	xxxxxxx
	Conduit	8	23	176,145	14,048	93.9	338	xxxxxxx	105,858	90.3	3,032	xxxxxxx
	Mechanical Tubing	10	24	386,975	29,326	89.2	2,023	xxxxxxx	225,746	87.6	17,303	xxxxxxx
	Wire rods	20	25	xxxxxxx	138,693	xxx	29,192	20,197	1,019,580	xxx	122,903	175,493
	Wire—Drawn	40	26	2,321,900	202,452	102.6	9,370	2,296	1,500,956	97.1	99,748	14,852
	Nails and staples	19	27	1,132,610	62,826	65.3	3,907	xxxxxxx	536,296	71.1	48,040	xxxxxxx
	Barbed and twisted	16	28	462,210	20,270	51.6	4,234	xxxxxxx	184,998	60.1	41,363	xxxxxxx
	Woven wire fence	15	29	746,185	23,106	36.4	282	xxxxxxx	216,541	43.6	1,538	xxxxxxx
	Bale ties	11	30	110,970	7,574	80.3	-	xxxxxxx	55,935	75.7	141	xxxxxxx
	All other wire products	7	31	39,280	2,008	60.2	3	xxxxxxx	13,869	53.0	3	xxxxxxx
	Fence posts	13	32	136,195	5,551	48.0	131	xxxxxxx	49,916	55.0	726	xxxxxxx
	Black plate	12	33	343,635	40,603	139.1	3,219	-	285,471	124.8	26,479	43
	Tin plate—Hot rolled	7	34	515,620	40,779	93.1	9,231	xxxxxxx	210,666	61.4	27,073	xxxxxxx
	Cold reduced	11	35	3,527,040	319,012	106.5	28,399	xxxxxxx	1,998,124	85.1	184,477	xxxxxxx
	Sheets—Hot rolled	28	36	xxxxxxx	585,967	xxx	19,425	14,387	5,067,395	xxx	204,945	148,453
	Galvanized	15	37	xxxxxxx	135,364	xxx	6,518	xxxxxxx	1,150,972	xxx	76,900	xxxxxxx
	Cold rolled	17	38	xxxxxxx	242,091	xxx	6,886	xxxxxxx	2,142,368	xxx	48,657	xxxxxxx
	All other	14	39	xxxxxxx	69,192	xxx	2,419	xxxxxxx	335,680	xxx	16,127	xxxxxxx
	TOTAL SHEETS	31	40	13,160,830	1,032,614	92.4	35,248	14,387	8,896,415	101.5	346,629	148,453
	Strip—Hot rolled	24	41	3,211,580	146,622	53.7	5,530	16,865	1,343,077	62.8	52,196	170,126
	Cold rolled	36	42	1,443,355	106,303	86.7	1,255	xxxxxxx	827,792	86.1	12,163	xxxxxxx
	Wheels (car, rolled steel)	5	43	422,825	21,477	59.8	687	xxxxxxx	168,103	59.7	1,124	xxxxxxx
	Axles	5	44	480,350	18,620	45.6	400	xxxxxxx	123,767	38.7	2,029	xxxxxxx
	Track spikes	11	45	327,275	13,711	49.3	360	xxxxxxx	116,840	53.6	2,385	xxxxxxx
	All other	4	46	32,100	2,525	92.6	-	xxxxxxx	19,197	89.8	79	xxxxxxx
	TOTAL STEEL PRODUCTS	155	47	xxxxxxx	5,573,666	xxx	516,540	339,679	42,749,649	xxx	3,576,586	2,894,809
	Pig iron, ferro manganese and spiegel	27	48	xxxxxxx	689,193	xxx	45,623	209,398	5,357,894	xxx	379,866	1,538,002
	Ingot moulds	4	49	xxxxxxx	69,176	xxx	485	xxxxxxx	498,880	xxx	2,790	xxxxxxx
Iron Products	Bars	12	50	166,195	8,528	60.4	146	305	63,573	57.4	624	2,970
	Pipe and tubes	3	51	109,300	6,461	69.6	225	xxxxxxx	44,584	61.3	1,782	xxxxxxx
	All other	2	52	71,000	2,898	48.0	828	-	14,247	30.1	2,508	-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	14	53	281,995	17,887	74.7	1,199	305	122,404	65.2	4,914	2,970

Total Number of Companies Included - 173

The estimated average yield of products for sale from ingots produced by the companies included above is 71.1 *%, which applied to their total ingot capacity equals* 59,563,800 *net tons of finished rolled products. Production for sale, less shipments to members of the industry for further conversion, related to the estimated yield is as follows:*

Current month 5,233,987 *N. T.;* 103.4 *%*
Year to date 39,854,840 *N. T.;* 100.5 *%*

DURING 1940, THE COMPANIES INCLUDED ABOVE REPRESENTED 97.6% OF THE TOTAL OUTPUT OF FINISHED ROLLED PRODUCTS.

If You Are Not A Member Of The Wire Association—Now Is A Good Time To Join!
The Annual Dues Are $10.00 — For detailed information address
RICHARD E. BROWN, Secretary
300 Main Street, THE WIRE ASSOCIATION Stamford, Conn.

Exports and Imports of Wire

Exports of Iron and Steel Gain In July — Imports Decline

EXPORTS of iron and steel products in July, 478,016 gross tons valued at $34,855,419, showed a gain over the June figure of 398,667 tons valued at $35,213,412, but were well below the July 1940 figure of 707,809 tons valued at $39,512,005.

✦ ✦ ✦

CUMULATIVE seven months exports totaled 3,494,684 tons valued at $258,057,699 compared with exports of 3,472,752 tons valued at $237,340,096 during the comparable period of 1940.

✦ ✦ ✦

NON-ALLOY ingots, blooms, etc., was, in point of tonnage, the most important item in the July trade, the total of 115,778 tons being almost double the 58,595 tons exported in June. Pig iron took second place, the 63,057 tons exported in July being 27,655 tons above the June figure. Non-alloy 'black' steel sheets, 36,727 tons, ranked third, followed by tin plate and taggers' tin with its 23,066 ton total.

✦ ✦ ✦

Imports Down

IMPORTS of iron and steel products declined in July to 1,631 gross tons, valued at $219,276, from the June figure of 3,717 tons, valued at $374,166. Receipts in July 1940 were 3,390 tons, valued at $351,826.

✦ ✦ ✦

CUMULATIVE 7 months imports for 1941—12,339 tons, valued at $1,967,352 — were well below the 42,178 tons, valued at $4,851,403, registered for the comparable period of 1940.

✦ ✦ ✦

RAILS and track material was the chief item imported with 884 tons, all from Canada. Ferrosilicon was second with 369 tons, also all from Canada, followed by flat wire and steel strips with 163 tons, all from Sweden.

✦ ✦ ✦

CANADA was by far the chief source of supply, accounting for 1,391 tons, followed by Sweden with 164 tons and the United Kingdom with 74 tons.

✦ ✦ ✦

Scrap Exports Gain Slightly

AT 59,905 gross tons valued at $1,160,533, exports of scrap in July registered a slight gain over June's trade of 59,018 tons valued at $1,059,524. Exports in July 1940 had amounted to 327,129 tons valued at $5,459,356.

✦ ✦ ✦

CUMULATIVE exports for 1941 totaled 475,785 tons valued at $9,271,884 compared to 1,805,935 tons valued at $30,551,194 for the seven months of 1940.

✦ ✦ ✦

IRON and steel scrap accounted for 58,637 tons of the July total, this figure being further

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.

Model E.-I-S Welder Capacity .010 to .062" high & low carbon wire.

MICRO PRODUCTS COMPANY

20 NORTH WACKER DRIVE, CHICAGO, ILL.

Telephone, State 7468

broken down as follows: No. 1 heavy melting, 14,689 tons; No. 2 heavy melting, 30,802 tons; baled and bundled, 5,255 tons; cast and burnt, 1,691 tons; and other iron and steel scrap, 6,200 tons.

✦ ✦ ✦

TIN plate scrap, tin plate circles, strips, cobbles, etc., waste-waste tin plate, and terneplate clippings and scrap were all represented in the remaining 1,268 tons of scrap exported.

✦ ✦ ✦

REFLECTING the increasing shortage of scrap in the United States, imports of that material climbed to 9,418 tons valued at $93,722 in July from the 6,473 tons valued at $60,856 in June. Imports of scrap in July 1940 had amounted to only 152 tons valued at $2,286.

✦ ✦ ✦

CUBA contributed 9,126 tons of scrap in July, with Surinam, the U. S. S. R. (Russia), and Canada supplying the remainder.

✦ ✦ ✦

Argentina

TOTAL imports of iron and steel products in August 1941, with the United States share shown in parentheses, were as follows: Sheets, 2,036 short tons (2,003); tin plate, 12,211 (4,665); pipes, 1,349 (911); wire, 2,070 (2,064). The United Kingdom supplied the rest of the tin plate and sheets and 407 tons of the pipes, and Brazil the remainder.

✦ ✦ ✦

Brazil

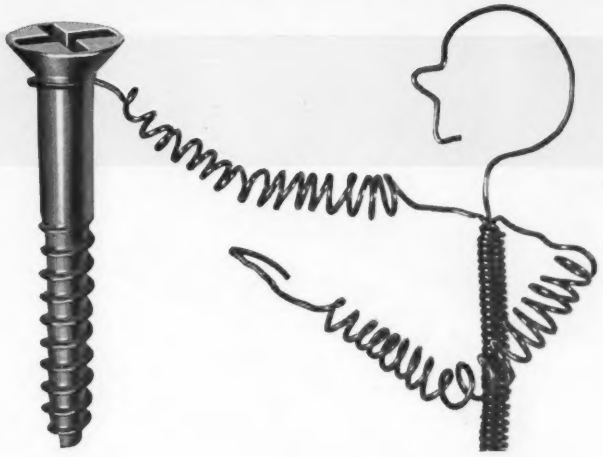
EXPORTS of iron ore through the port of Rio de Janeiro totaled 148,855 long tons in the first 7 months of 1941—111,305 tons by A. Thun & Co., Ltd., 24,950 tons by Cia. Servicos de Engenharia S. A., 7,100 tons by S. A. Martinelli, and 5,500 tons by Castro Lopes & Tebyrica.

✦ ✦ ✦

EXPORTS in July totaled 37,000 tons—29,500 tons by A. Thun, 5,500 tons by Castro Lopes & Tebyrica, and 2,000 tons by Cia. Servicos Engenharia. With the exception of 6,800 tons shipped by A. Thun to the United Kingdom, the entire amount was exported to the United States (Baltimore).

(*Please turn to Page 706*)

It's the Head that Counts . . . Mostly



in

KEELER Cross Recess Screws

. . . using KEYSTONE Wire

A head that can stand up . . . under the punishing twists of man-sized screw drivers and hand braces . . . is one of the success secrets of wood screws, tapping screws, drive screws and machine screws.

On this important point, the Keeler Brass Company of Grand Rapids, Michigan, states, "Our use of Keystone special analysis cold heading wire has helped greatly in the production of our trouble-free line of 'Perfection' Screws . . . and with trouble-free shop practice, too."

. . . Appreciated testimony is this — proof of the uniformity and processing adaptability of Keystone wire. The Keeler Company, one of the leaders in its industry, yearly processes a large tonnage of Keystone Wire into its "Perfection" line of screws.

KEYSTONE

STEEL & WIRE CO. Dept. W PEORIA, ILLINOIS

HIGH CARBON OR LOW CARBON

SAMSON SPRING WIRE

REG. U.S. PAT. OFF. KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

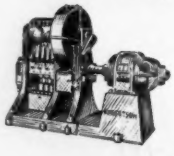
Bright-Tinned
Coppered
Annealed
Galvanized

HONORS to the Toolmaker

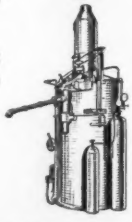
LEGEND has it that when the temple of Jerusalem was completed, King Solomon gave a feast to the artificers employed in its construction. On unveiling the throne it was found that a smith had usurped the seat of honor not yet awarded, whereupon the people clamored and the guard rushed to cut him down. "Hold, let him speak!" commanded Solomon. "Thou hast, O King, invited all craftsmen but me. Yet how could these builders have raised the temple without the tools I have fashioned?" "True," decreed Solomon, "the seat is his of right." All honor to the toolmaker.

So, too, should honors go to the many who are contributing the tools and equipment to help make America strong.

Robertson is proud of the job it is doing . . . proud of its reputation for advanced design, quality materials and honest craftsmanship that insure uniform, steady output at a saving!



Details of Robertson Hydraulic Equipment are fully described in literature . . . yours without obligation. A note on your letterhead does the trick.



HYDRAULIC PRESSES • HIGH PRESSURE HYDRAULIC PUMPS • CLOSED LEAD MELTING POTS

JOHN ROBERTSON CO., INC.

125-137 Water St., Brooklyn, N.Y.

Exports and Imports of Wire

(*Continued from Page 705*)

STOCKS of iron ore held at Rio de Janeiro totaled 76,310 tons at the close of July, 58,684 tons of which were in the hands of A. Thun & Co.

✦ ✦ ✦

A SHIPMENT of pig iron, totaling 100 metric tons, left Brazil early in August for Japan.

✦ ✦ ✦

Canada

OF the 1,828,589 short tons of scrap iron and steel consumed in Canada in 1940, 1,323,501 tons were used in steel furnaces, 375,000 tons in iron furnaces, 46,050 tons in rolling mills, 45,920 tons in ferro-alloy furnaces, 28,691 tons in iron blast furnaces, and 9,427 tons in furnaces processing artificial abrasives. In 1940 the scrap consumed by steel furnaces, averaging 72.4 percent of the total, was made up of 541,582 tons of scrap originating in consuming works and 781,919 tons collected throughout the country.

✦ ✦ ✦

IMPORTS into Canada of scrap iron and steel rose sharply in 1940—to 415,981 short tons, compared with 177,564 tons in 1939. Practically all of Canada's imports of the scrap originate in the United States. Exports, on the other hand, dwindled to only 3,261 short tons in 1940, from 93,837 tons in the preceding year.

✦ ✦ ✦

Priority Ratings Announced for Copper Scrap

APPROXIMATELY 150 refiners, ingot makers, and other re-melters of copper scrap and copper-base alloy scrap, who are producing efficiently, and who have a substantial volume of defense orders, are given the assistance of an A-10 rating in securing such scrap, in an order announced today by **Donald M. Nelson**, Director of Priorities.

✦ ✦ ✦

SCRAP acquired with the assistance of the A-10 rating may be used only to fill defense orders. The rating may not be used to secure deliveries of scrap in quantities greater than necessary for the effective operations of the producer's plant in the production

of these orders, or to secure earlier delivery than is required.

✦ ✦ ✦

UPON application to OPA, according to the revised schedule, a special premium above the ceiling prices may be allowed in the case of copper wire scrap especially selected and prepared for use in the production of copper sulphate or other chemicals, copper powder, or by steel mills, iron foundries, aluminum smelters, etc.

✦ ✦ ✦

Steel Plants May Import Iron and Steel Scrap at Prices Above Maximums

AUTHORITY to import iron and steel scrap from any foreign source at prices exceeding the established maximums will be granted to steel plants and foundries under certain conditions, **Leon Henderson,** administrator, Office of Price Administration, announced recently.

✦ ✦ ✦

AT the same time, OPA issued an amendment to the scrap schedule setting up Cincinnati as a basing point for scrap of railroad origin.

✦ ✦ ✦

IN the case of higher-than-ceiling imports, Mr. Henderson stated, buyers first must apply to OPA for permission, furnishing complete details of the proposed transaction. If authority is given and the scrap brought in, the buyer then must supply OPA with certified copies of the bills of lading.

✦ ✦ ✦

INQUIRIES from steel plants indicate that scattered supplies of scrap are available for purchase in Cuba, Mexico and Central and South America. OPA considers it important that United States mills and foundries busy on defense contracts be placed in a position to buy and import this important raw material.

✦ ✦ ✦

THE addition of Cincinnati as a basing point for railroad scrap represents a further refinement of the schedule, and places railroads in that area on a parity with sellers of industrial scrap.

For Information
Regarding
The Wire Association
Address
Richard E. Brown, Secretary
Stamford Trust Co. Bldg.
300 Main St. Stamford, Conn.

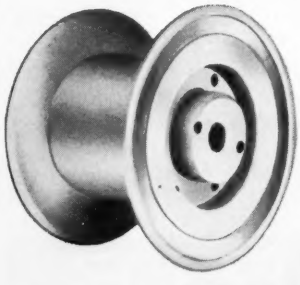
Change in Secondary Zinc Priorities Announced

PRODUCERS of zinc, zinc oxide, and zinc dust from secondary materials, under toll agreements, are exempted from setting aside any of these materials for pool uses, in an amendment to General Preference Order M-11, announced today by Donald M. Nelson, Director of Priorities. Galvanizers who redistill zinc dross or skimmings for their own use are still subject to the pool requirements.

✦ ✦ ✦

THE amendment also shifts from the processor to the owner of the materials, the obligation of setting aside a portion of zinc produced from primary materials under toll agreements.

FINE WIRE HIGH SPEED WIRE DRAWING SPOOLS



James Day (Machinery) Ltd.,
66, Bartholomew Close,
London, E. C. 1., England.

MOSSBERG **PRESSED STEEL** CORP.

A complete line of HEAVY DUTY PRECISION SPOOLS and REELS especially designed for high speed wire drawing and annealing.

The degree of efficiency obtained by the HIGH SPEED WIRE DRAWING MACHINE is largely dependent upon the accuracy and durability of the take-up spool.

The use of our PRECISION SPOOLS will increase your machine efficiency and eliminate your spool difficulties.

Complete range of sizes.

MOSSBERG PRESSED STEEL CORP
18 West Street,
ATTLEBORO, MASSACHUSETTS, U. S. A.

COMBINATION
500 lb. CAPACITY WIRE DRAWING — ANNEALING — STRANDING — REEL.

Outstanding Personalities of the Wire Industry

American Steel & Wire Personnel Changes at Worcester, South Works

THREE personnel changes in the operating department at its Worcester, Mass., operations have been announced by American Steel and Wire Co., subsidiary of U. S. Steel Corp.

✦ ✦ ✦

ROBERT D. KNIGHT has been appointed superintendent of the spring mill at South Works, while **Harry F. Clarke** has been made assistant superintendent at the same plant. **George E. Hansen** has been named product engineer in the metallurgical department at South Works.

✦ ✦ ✦

A GRADUATE of Massachusetts Institute of Technology, where he obtained a B. S. degree in engineering and business administration, Mr. Knight became associated with American Steel & Wire in November, 1932, as a technical apprentice at the Trenton, N. J., Works. In August, 1933, he was made a sub-foreman at the same plant and in May, 1935, was promoted to assistant department head. Four years later he was transferred to South Works as assistant general foreman in the spring mill, which position he has held to the present time.

✦ ✦ ✦

MR. CLARKE gained his B. S. degree in electrical engineering at Worcester Polytechnic Institute and started with the Wire Company in December, 1936, as a technical apprentice at Central Works in Worcester. In 1938 he was transferred to South Works and since September, 1940, has been general foreman in the rail bond department.

✦ ✦ ✦

MR. HANSEN is a graduate of the University of Maine and has been connected with American Steel and Wire since April, 1927. He has been general foreman in the spring mill since April, 1939.

✦ ✦ ✦

John J. McKernan, Manager Defense Program Planning, Western Electric Company

JOHN F. McKERNAN, until recently chief of equipment in the production division of the OPM, has returned to Western Electric in the newly-created post of manager of defense program planning, charged with coordinating production on the Company's $100,000,000 defense job, it was announced Friday, Sept. 26 by Frederick R. Lack, manager of Western Electric's Specialty Products Division at Kearny, N. J.

✦ ✦ ✦

MR. McKERNAN, making Kearny his headquarters, will set up an organization which will integrate defense production with the manufacture of telephone

6 IN. INSULATOR and EXTRUDER

for Continuous Insulation of Wire and Cable to 3½"

Another N. E. Wire Insulator goes into defense work, designed to do one big rubber insulation job, but ready to handle any size of wire from 16 Ga. up to 3½"—can be converted to handle plastics with a minimum of change. The extra mechanical in-built strength assures continuous operation under peak production. N. E. builds the complete line of rubber working machinery. Put your wire insulation problem up to N. E.'s 30 years of specialized experience.

NATIONAL-ERIE
CORPORATION
ERIE, PA., U.S.A.

apparatus for the Bell System, guaranteeing efficient use of all current plant capacities at the Company's Works at Point Breeze, Baltimore, Md.; and Chicago; as well as Kearny.

✦ ✦ ✦

A VETERAN of more than twenty years' service with Western Electric, Mr. McKernan was program planning manager at New York headquarters from 1935 to 1937, and merchandise manager at the Point Breeze plant until early this year, when he went to the OPM.

✦ ✦ ✦

Paul M. Janko, Sales Manager, Moslo Machinery, Inc.

ERNEST P. MOSLO, president of Moslo Machinery, Incorporated, 4516 Superior Avenue, Cleveland, Ohio, announces the appointment of **Paul M. Janko** as Sales Manager.

✦ ✦ ✦

MR. JANKO has been covering the Pittsburgh area for the company and will continue to contact his many friends and customers at frequent intervals. He will, in addition, work with other salesmen of the Company and with the Home Office in Cleveland.

✦ ✦ ✦

A NEW member was recently added to the Moslo staff—**Mr. R. C. Burton**. Mr. Burton will direct the Advertising and Sales Promotional activities of the Company.

✦ ✦ ✦

Change of Company Name

STOLER & CURLL, INC., announce the change of their firm name to **Vulcan Corp., Philadelphia, Pa.**, with the following personnel:

H. E. Curll, formerly Chief Engineer of Philadelphia Drying Machinery Co., and more recently Vice-President, Treasurer and Chief Engineer of Stoler & Curll, Inc., is President and Treasurer.

A. H. Kruger, formerly Sales Manager of Philadelphia Drying Machinery Co., and more recently Sales Manager of R. S. Products Co., is Vice-President, Secretary and Sales Manager.

B. G. Tarkington, formerly Chief Engineer of Bellevue Industrial Furnace Co., is Chief Engineer.

VULCAN CORP. has acquired all patents, patterns, etc. of the Furnace Division of Philadelphia Drying Machinery Co.

✦ ✦ ✦

Norman P. Goss, Research Engineer, American Steel & Wire Co.

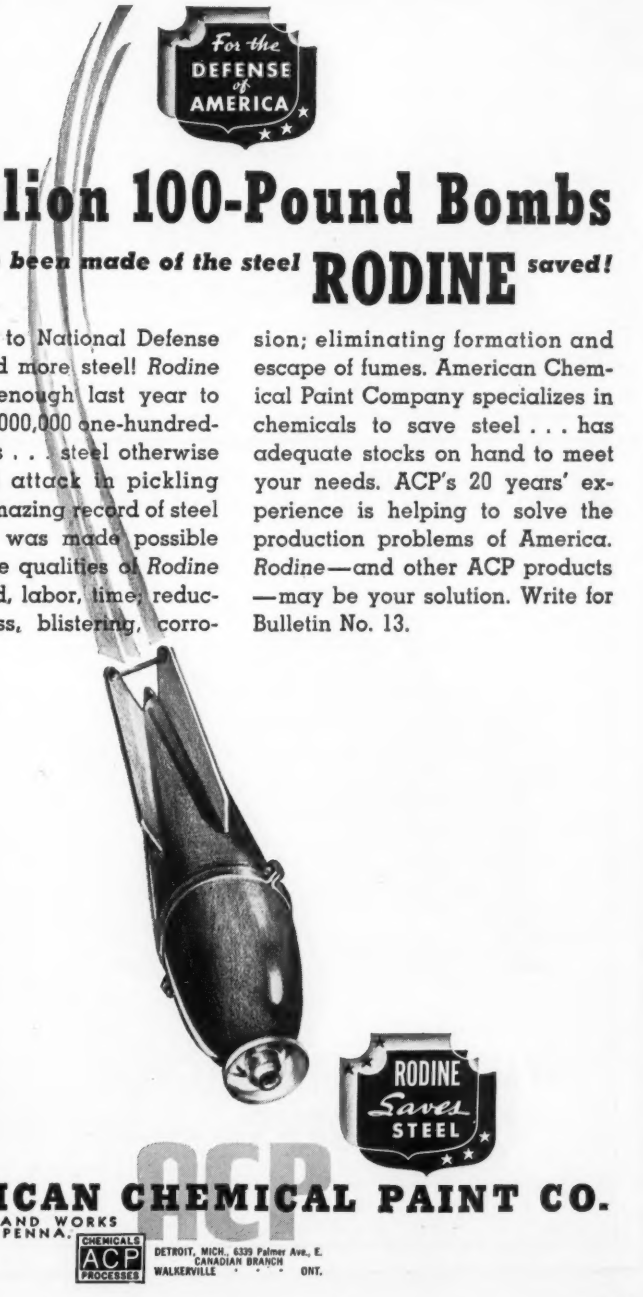
NORMAN P. GOSS has been appointed a research engineer of American Steel & Wire Co., subsidiary of U. S. Steel Corp., in Cleveland.

A GRADUATE of Case School of Applied Science, Mr. Goss joined the General Electric Co. in 1925 where he engaged in X-ray diffraction investigation of metals. In 1927 he became associated with American Steel & Wire Co., where he continued his work until December, 1930.

✦ ✦ ✦

IN the meantime Mr. Goss had received the degree of Master of Science from Case School. From

(*Please turn to Page 721*)


For the DEFENSE of AMERICA
3 Million 100-Pound Bombs
could have been made of the steel RODINE saved!
Steel is vital to National Defense . . . steel and more steel! Rodine saved steel enough last year to have made 3,000,000 one-hundred-pound bombs . . . steel otherwise lost by acid attack in pickling baths. This amazing record of steel conservation was made possible by the unique qualities of Rodine—saving acid, labor, time; reducing brittleness, blistering, corrosion; eliminating formation and escape of fumes. American Chemical Paint Company specializes in chemicals to save steel . . . has adequate stocks on hand to meet your needs. ACP's 20 years' experience is helping to solve the production problems of America. Rodine—and other ACP products—may be your solution. Write for Bulletin No. 13.
RODINE Saves STEEL
AMERICAN CHEMICAL PAINT CO.
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CHEMICALS ACP PROCESSES
DETROIT, MICH., 6339 Palmer Ave., E.
CANADIAN BRANCH WALKERVILLE . . . ONT.

A Review of Recent Wire Patents

No. 2,254,238, METHOD OF PRODUCING REVERSE TWIST BARB-WIRE, patented on September 2, 1941 by Henry A. Nelson, De Kalb, Ill.

The method comprises providing a number of parallel wire strands, at least some of which carry barbs, and simultaneously twisting spaced parts thereof in opposite directions.

✦ ✦ ✦

No. 2,254,396, MANUFACTURE OF WIRE FABRICS, patented on September 2, 1941 by Otto Carl Scherfel, Philadelphia, Pa., assignor to Audubon Wire Cloth Corporation, Philadelphia, Pa., a corporation of New Jersey.

Helically coiled wires are connected at their bights by cross rods, which latter are crimped to engage the helics.

✦ ✦ ✦

No. 2,254,525, MANUFACTURE FOR MANUFACTURING COIL SPRINGS, patented on September 2, 1941 by Hubert B. Hathaway, Windsor, Ontario, Canada, and Bernard Heilman, Detroit, Mich., assignors to L. A. Young Spring & Wire Corporation, Detroit, Mich., a corporation of Michigan.

This machine is adapted to effect electrical heat treatment of coil springs and to cause them to assume their initial set.

✦ ✦ ✦

No. 2,254,762, WIRE WRAPPING METHOD, patented on September 2, 1941 by Otto Thiel, Detroit, Mich.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

An adhesive-coated ribbon of material is so directed that its adhesive side scrapes along the advancing wire at a point prior to the point where the ribbon is wrapped in overlapping turns around the wire, with its adhesively coated surface then engaging the wire and the dry surface of an already wrapped turn of paper.

✦ ✦ ✦

No. 2,255,016, PROCESS FOR TREATING IRON AND STEEL, patented on September 2, 1941 by Earle C. Smith, Cleveland Heights, and George T. Motok, Massillon, Ohio, assignors to Republic Steel Corporation, Cleveland, Ohio, a corporation of New Jersey.

A method of decreasing the oxygen content is provided by increasing the nitrogen content, and improving the physical properties of the metal which includes the step of bringing into nitrogen-liberating contact with the molten metal between about one-half pound and eight pounds per ton of metal, of calcium cyanamid.

✦ ✦ ✦

No. 2,255,364, CONVEYOR BELT, patented on September 9, 1941 by Clarence E. Pink, Cambridge, Md.

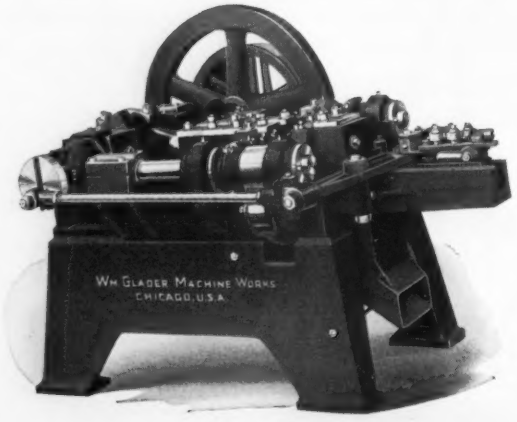
With the interlaced helical wires of the belt are supporting pins attached to some of the convolutions of the helical wires, the pins extending upwardly from the belt in such degree as to hold the product spaced from the belt, to prevent belt marking of the product, the pins having a total cross sectional area of relatively small proportions with respect to total belt area.

✦ ✦ ✦

No. 2,255,871, ELECTRICAL CONDUCTOR COATED WITH SEPARATOR STRIP AND METHOD OF MANUFACTURE, patented on September 16, 1941 by Eli Freydberg, New York, John F. McCullough, New Rochelle, and Raymond D. Coldwell, New York, N. Y., assignors to Freydberg Bros., Inc., New York, N. Y., a corporation of New York.

About the wire conductor, is an insulation layer of rubber vulcanized in place, and a separator layer comprising cellophane, and which is bonded to the metallic core by an adhesive, whereby the separator layer is prevented from slipping along the core, the adhesive being plastic only at temperatures having a lower limit slightly below 300°F., whereby the adhesive may be caused to give the bond originally when the rubber is vulcanized in place by the entire conductor being subjected to a temperature higher than slightly below 300°F.

GLADER WIRE NAIL MACHINE SCORES AGAIN



WM. GLADER MACHINE WORKS

210 N. Racine Ave. Chicago, Illinois

A new Wire Mill under construction in the State of Texas will install GLADER WIRE NAIL machines 100%.

The production figures on common nails shown below, are guaranteed.

SIZE MACH.	SIZE WIRE	MAX. LENGTH OF WIRE	NUMBER OF NAILS PER MIN.	CAP. IN POUNDS PER HR.
#00A	#16	1⅛"	700	37.2
#00	#14	1¼"	550	55
#0	#12	1¾"	450	89
#1	#10	2½"	400	192
#2	#8	3½"	325	310
#3	#4	5"	225	523
#4	#1	7"	190	622
#4s	5/16"	9"	175	1155
#5	⅜"	12"	160	2400

This high output and economical operation account for the GLADER machine being accepted as standard equipment in all recent installations.

No. 2,256,027, FLUID COOLED ELECTRIC CONDUCTORS, patented on September 16, 1941 by Albert D. Jardine and Harry V. Beronius, Detroit, Mich.

An open-ended conduit is enclosed in the conductor sheathing.

✦ ✦ ✦

No. 2,256,060, REINFORCING BAR, patented on September 16, 1941 by Joseph D. Stites, Onancock, Va.

Two rods are twisted together and connected by a web of lesser cross-sectional area than either individual portion, the portions and web being twisted as a unit about the longitudinal axis of the bar, and longitudinally spaced, relatively narrow transversely extending ribs interconnecting the portions and the web.

✦ ✦ ✦

No. 2,256,158, SPRING, patented on September 16, 1941 by Eugene R. Weisbender, Manhattan, Kans.

A ribbon-like spring is provided, formed of a continuous piece of elongated stock into substantially uniplaned surface-forming members transversely of the ribbon and spaced from one another longitudinal of the ribbon, and a spring arch between each adjacent pair of the members, the arches being disposed on a plane at right angles to the plane of the ribbon.

✦ ✦ ✦

No. 2,256,492, METHOD OF TREATING COPPER AND PRODUCT THEREOF, patented on September 23, 1941 by Albert J. Phillips, Plainfield, Albert A. Smith, Jr., Metuchen and John S. Smart, Jr., Orange, N. J., assignors to American Smelting and Refining Company, New York, N. Y., a corporation of New Jersey.

The product, commercial tough-pitch copper, contains antimony, but not more than approximately 0.02% thereof, the antimony being substantially entirely in solid solution in the copper in the presence of from 0.025% to 0.05% oxygen contained in the copper.

✦ ✦ ✦

No. 2,256,684, HANDLING OF ROD BUNDLES OR THE LIKE, patented on September 23, 1941 by Myles Morgan, Worcester, and John N. Whalen, Boylston, Mass., assignors to Morgan Construction Company, Worcester, Mass., a corporation of Massachusetts.

Means is provided to unhook the bundles from their supporting hooks and lower them.

✦ ✦ ✦

No. 2,256,912, MANUFACTURE OF WIRE-DRAWING DIES, patented on September 23, 1941 by Elmer B. Welch, McKeesport, Pa., assignor to Firth-Sterling Steel Company, a corporation of Pennsylvania.

This method comprises assemblying a nib which is less in longitudinal extent than the length of the bore within and at the bottom of the bore in the casing, mounting the casing between two electrodes, the electrodes engaging the opposite heads or ends of the casing, causing an electric current to pass between the electrodes and through the central body portion of the casing while exteriorly subjecting the casing to the influence of a cooling medium, whereby the substance of the casing is softened interiorly while exteriorly it remains rigid, and subjecting the so conditioned casing, in the centrally heated body portion, to compression in the direction of the axis of the bore, whereby the walls of the bore close upon the contained nib, making intimate contact with the adjacent walls of the nib.

✦ ✦ ✦

No. 2,256,913, MANUFACTURE OF WIRE-DRAWING DIES, patented on September 23, 1941 by Elmer B. Welch, McKeesport, Pa., assignor to Firth-Sterling Steel Company, a corporation of Pennsylvania.

The invention lies in a press for assisting in carrying out the method above.

✦ ✦ ✦

No. 2,257,367, WIRE SPRING, patented September 30, 1941 by Samuel S. Bernstein, Beverly Hills, Calif.

A wire is provided with lateral undulations forming alternate U-shaped portions and diagonal connecting portions, the diagonal connecting portions having a longitudinal curvature, the U-shaped portions being flat.

✦ ✦ ✦

No. 2,257,644, WIRE DRAWING MECHANISM, patented on September 30, 1941 by Robert C. Pierce, Niles, Mich., assignor to National Standard Company, Niles, Mich., a corporation of Michigan.

Adjustable means is carried by the die block and which engages the die holder and which permits adjustment of the plane of the die block to aline the die opening with the wire without interfering with the necessary shifting of the die in the holder.

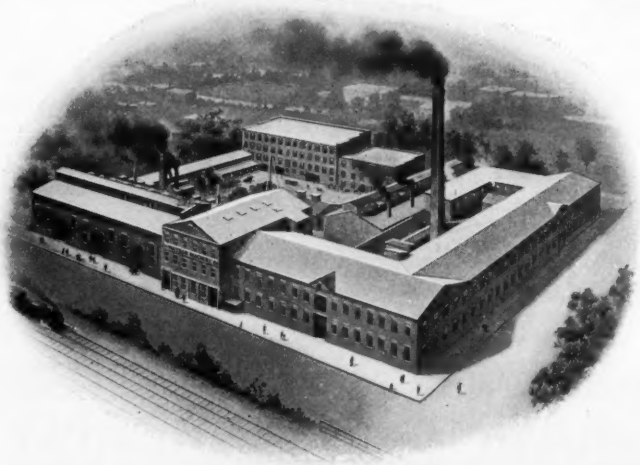
THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY

Stranders
Bunchers
Cablers
Closers
Armor. Machines
Tapers
Juters
Serving Heads
Compound Tanks
Saturating Tanks
Powderers and Chalkers
Capstan Sections



Let-offs
Gang-Spoolers
Re-winders
Capstan Takeups
Continuous Takeups
Heavy-Duty Takeups
Traverses
Measuring Mach.
Testing Mach.
Vulcanizers
Polishers
Reel Crutches

MEAS. MACH., TRAVERSES, REEL CRUTCHES, BUNCHERS, SMALL POWDERERS, ETC.—USUALLY CARRIED IN STOCK

LITERATURE AVAILABLE ON ALL LISTED UNITS

Electrolytic Zinc-Coated Wire

(*Continued from Page 693*)

the necessary current for electrolyzing the zinc from the solution and depositing it upon the wire.

✦ ✦ ✦

FROM the electrolytic cell, in which the Bethanized coating is applied, the wire is passed through rinsing baths and subsequently polished with a rapidly rotating burnishing machine or, in some cases, by employing a very light draft in a die. The finished product is taken up on blocks similar to those conventionally used in the hot galvanizing process.

✦ ✦ ✦

Some Current Applications of Bethanized Wire

IT may be of interest to say a few words about the applications and utility of this special zinc coated wire. Almost daily there are new demands which the product is filling. The field of application has become very broad indeed, ranging from merchant wire products, such as fence and barb wire and nails and staples formed directly from the Bethanized wire, to unusually high strength galvanized rope and cable wire.

✦ ✦ ✦

ONE of the early developments was heavily coated telephone wire and heavily coated strand wire. The demands for these products in heavy zinc coatings has shown a very healthy progress. Obviously with the introduction of these heavier coatings, an extension of the series of coating weights standard in the industry was desirable. For that purpose we chose coating weight requirements of standard specifications in telephone wire and strand wire as our first item. Therefore, our "A" coating was set at the equivalent, from a coating weight standpoint, of charcoal wiped hot galvanized wire. Our next coating weight we named "B" coating which was standardized as twice the coating weight of "A" coating; and the third weight we designated as "C" coating and set it at three times the weight standardized upon for "A" coating.

✦ ✦ ✦

WE set up this particular system of standard weights with a definite purpose in mind. In the utility field considerable experience had been gained as to the life of standard hot galvanized coatings,—for example on strand, —in many locations and under many different conditions of exposure. On the principle that the life of zinc coating would be at least proportional to the weight of zinc coating, it would be easy for utility engineers to estimate the life expectancy of strand in either the "B" or "C" coating weights from previous experience with double galvanized strand under similar exposure conditions, and this new product enabled the utility engineers in many instances to increase the life of a given installation, located in regions of more severe service, without the

SYNCRO *Thanks you!*

We sincerely thank the many wire manufacturers and their representatives who visited us at the recent convention. We were particularly gratified by the reception you accorded our latest development—equipment for high speed continuous wet drawing of low and high carbon steel wire.

We always welcome the opportunity of discussing your problems with you—and in working with you to solve them.

SYNCRO MACHINE COMPANY

RAHWAY, NEW JERSEY
McCORMICK BLDG., CHICAGO

REPRESENTED IN CANADA BY CANADIAN ELEVATOR EQUIPMENT CO. LTD., TORONTO

Machinery for the Wire Industry

SYNCRO

necessity of going to more expensive strand materials.

✦ ✦ ✦

THESE coating weights have become standardized by the **American Society for Testing Materials** in their specifications for galvanized steel wire strand, No. A122 and No. A218, from which the composite table of coating weights has been prepared as shown on Table I.

✦ ✦ ✦

THE ductility of the coating and the tight bond between the wire and the zinc makes it possible to use this wire in many woven products other than the conventional farm field fence. In chain link fence, for example, where heavy coatings were required to provide reasonable life in service, it had been the usual practice to galvanize the fabric after weaving. Such galvanized fabric usually carried a minimum average coating weight of 1.2 ozs. of zinc per square foot of surface. Bethanized wire with either 1.2 ozs. or 2.4 ozs. minimum of zinc per square foot of surface is successfully woven into all of the conventional designs of chain link fence without injury to the zinc coating. A definite advantage possessed by this product is the uniformity with which the coating is distributed on the surface of the wire. Many types of conveyor belts and other woven products of loom and weaving machines are now available in either light or heavy zinc coating weights and fabricated directly from the zinc coated wire without difficulty.

✦ ✦ ✦

ANY number of chain products, such as pump chains, which heretofore have been galvanized after fabrication, can be formed directly from the zinc coated wire.

✦ ✦ ✦

A LARGE quantity of Bethanized wire in gauges of from 16 to 18 in "A", "B" and "C" coatings is supplied for drawing into very fine wire, such as wire used for screen cloth, and also for such purposes as air-cleaners, which are made from a flat rolled wire produced from round wire drawn down to diameters in the neighborhood of .006" to .009" and then fabricated on knitting machines.

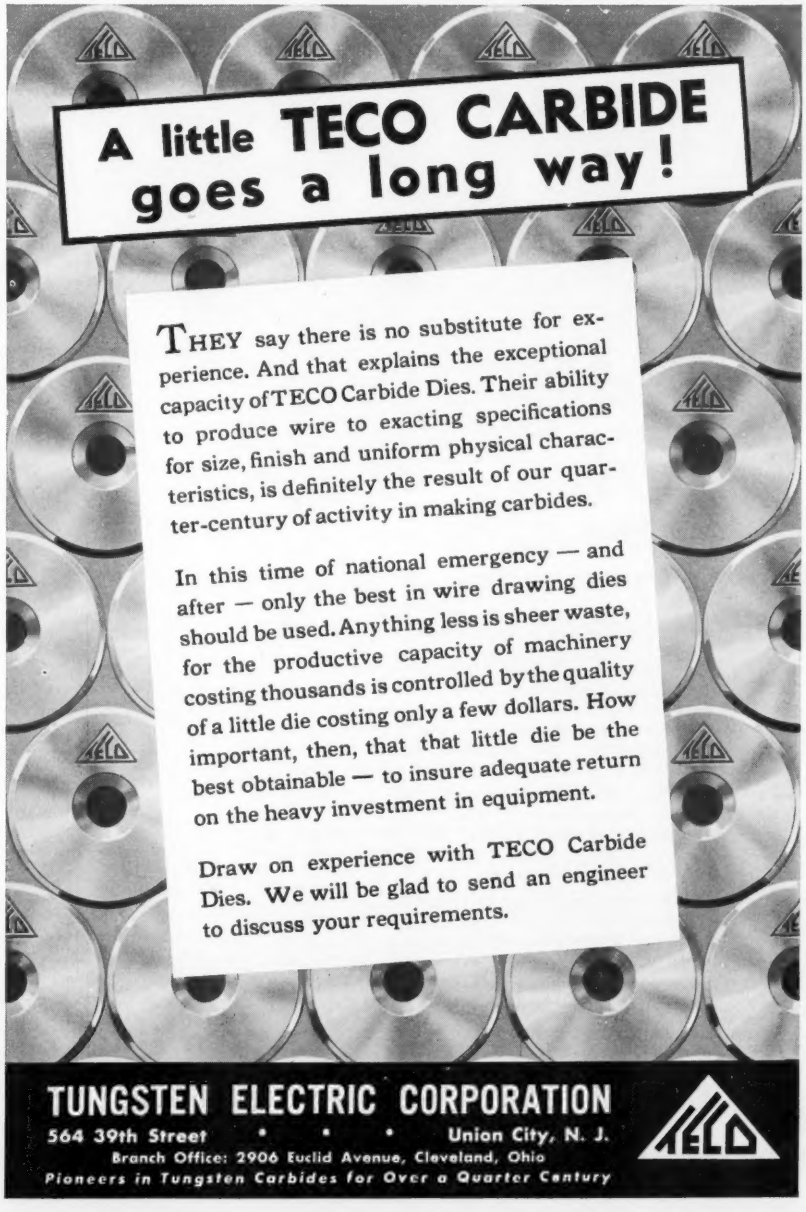
✦ ✦ ✦

AS a matter of interest, I might state that the first problem that we tackled in connection with drawing Bethanized wire was in the production of some 3 mil filament wire. Our units could not possibly handle so small a gauge as .003" so we worked on the proposition of drawing that wire directly from a 16 gauge soft steel wire, carrying a coating weight of about .6 oz. of zinc per square foot of surface. This 16 gauge wire was successfully drawn through something like 49 dies to a diameter of .0033" without any loss of zinc coating or without any injury to the coating.

✦ ✦ ✦

OUR next step in the development of the drawing of Bethanized wire was in the production of rope wire. We now use in substantial quantities, at our Williamsport Plant, Bethanized rope wire which is drawn to the finished size from stock which has

(*Please turn to Page 714*)


A little TECO CARBIDE goes a long way!
THEY say there is no substitute for experience. And that explains the exceptional capacity of TECO Carbide Dies. Their ability to produce wire to exacting specifications for size, finish and uniform physical characteristics, is definitely the result of our quarter-century of activity in making carbides.
In this time of national emergency — and after — only the best in wire drawing dies should be used. Anything less is sheer waste, for the productive capacity of machinery costing thousands is controlled by the quality of a little die costing only a few dollars. How important, then, that that little die be the best obtainable — to insure adequate return on the heavy investment in equipment.
Draw on experience with TECO Carbide Dies. We will be glad to send an engineer to discuss your requirements.
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Pioneers in Tungsten Carbides for Over a Quarter Century
TECO

Electrolytic Zinc-Coated Wire

(*Continued from Page 713*)

been given the necessary thickness of zinc coating at its last patenting point. We have developed the wire drawing technique to the point that there is no difficulty in employing the percentage of total reduction observed in the manufacture of high quality bright rope wire. This practice involves a reduction from the last patenting point of from 70% reduction to 90%, or more, depending upon the size of the wire and the particular type of rope into which the wire is to be fabricated. By this means it is obvious that we have a much wider range of physical characteristics available in rope wire than we previously had in the regular galvanized rope wire which we used prior to the development of this procedure. We can control the ductile properties of the wire so that the same or better torsional values are obtained as with standard high quality bright rope wire. Our range in tensile strength is materially extended, thus enabling us to produce ropes and hawsers of higher strength than formerly.

✦ ✦ ✦

FURTHERMORE, by means of the Bethanizing process we can provide heavier weights of coating than are ordinarily obtainable. An interesting example of such ropes is to be found in the construction of the world's largest pontoon bridge built at Lake Washington, Seattle, Washington. The cables used to anchor the pontoons of this bridge comprise about 25,000 feet of 2¾" diameter 6 x 35 rope with independent rope wire center. The individual wires making up this rope include a size range of from 0.106" to 0.141", all carrying a minimum coating weight of 1.6 ozs. per square foot. The minimum specified breaking strength of these ropes was 620,000 pounds and the ropes showed an average breaking strength of 685,000 pounds. The operating rope for propelling the draw pontoon of this bridge was 1½" diameter, of 6 x 25 construction with hemp center. The main wires of this rope were 0.095" diameter and the required coating weight was 1.4 ozs. Incidentally, in the production of the wire for this rope, we patented the high carbon stock at 0.192" diameter, applied 3 ozs. of zinc per square foot of surface to this patented stock and drew the wire to the finished size of 0.095", which represents a little more than 76% reduction by cold work after galvanizing. The finished wire had an average tensile strength of approximately 240,000 pounds per square inch, and a coating weight of 1.5 ozs. per square foot.

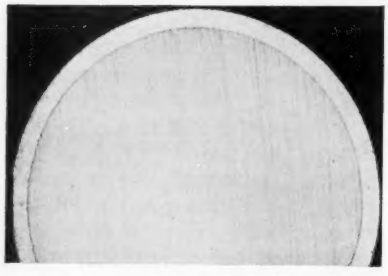
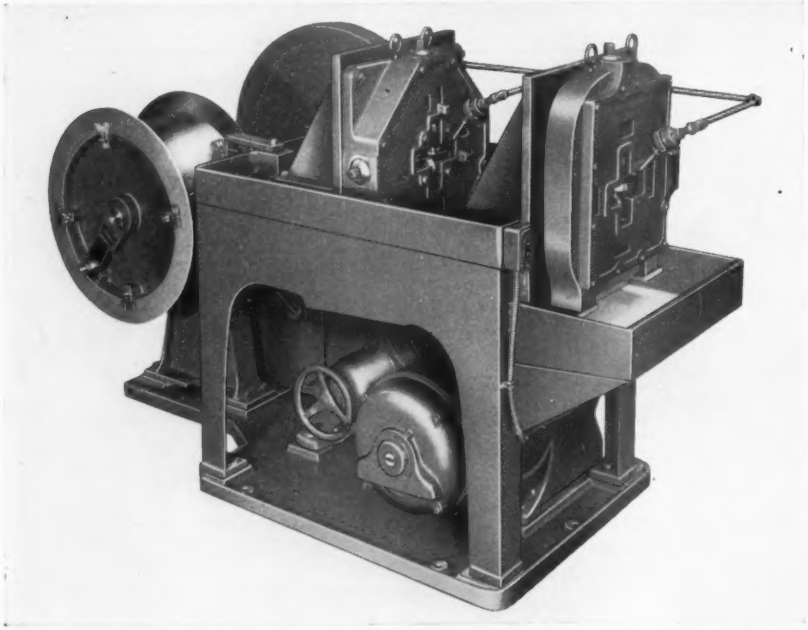


Figure 14. Unetched Section of Bethanized Wire. No. 9 gauge wire with 5.00 oz. coating weight. Magnification 25 diameters. ✦ ✦



Low cost production in forming wire shapes with Standard Tandem Turks Heads

Photograph shows a tandem mounting of a No. 4 adjustable draw plate (Turks Head). This unit is equipped with a circulating coolant system, with a variable speed motor drive and a takeup drum of the shedding type. Stands equipped with coolant circulating system are available for all sizes.

This tandem unit will reduce .300" round steel rod to approximately 3/16" square in one pass, at an average production rate of 140' per minute. Capacities from ½" round on the No. 5 Turks Head to .020' on the No. 2.

These Turks Heads can be either Universal or Plain types to produce rectangular, square, keystone, and irregular shapes.

In addition to the type shown above there are available other types arranged for location on bull blocks and draw benches.

Let us discuss possible applications of this machine to your work—address

★

Ask for catalogs showing Standard Swagers, Presses, Draw Benches, Rolling Mills, also.

IT'S STANDARD PRACTICE

MACHINERY COMPANY

PROVIDENCE, RHODE ISLAND

MANY items of spring wire have been made by coating high carbon patented stock and then drawing it into the finished sizes.

✦ ✦ ✦

TO these examples may be added a great variety of manufacturers wire items, which are used by companies who manufacture countless formed wire products. The coating weight on this wire often runs into the heavy coatings listed as "B" and "C". As a matter of information, Table II lists the manufacturers standard coating weights for types 1, 2 and 3 galvanized wire and also shows our coating weights of "A", "B" and "C" for the representative sizes of manufacturers wire.

✦ ✦ ✦

IN Figures 11, 12 and 13, are shown full cross section wire sections at 25 diameter magnification, made of 12 gauge wire coated with 0.8 oz., 1.66 ozs. and 2.51 ozs. coatings respectively. These illustrations are inserted to show the relative thickness of the standard coatings and they also make clear the degree of uniformity of those coatings. To compare with these, we have also prepared Figure 14, which represents a 5 oz. coating on a 9 gauge wire; as it was desirable to show this also at 25 diameter magnification, the limitation of the slide and negative dimensions prevented showing the full cross section.

Grateful acknowledgment is given to Dr. R. M. Wick, Mr. W. C. Clements and the Metallurgical and Operating Departments of the Johnstown and Sparrows Point Plants of the Bethlehem Steel Company for valuable help and advice in the preparation of this paper. ✦ ✦ ✦ ✦ ✦

Cambridge Conveyor Belts

THE **Cambridge Wire Cloth Company**, Cambridge, Maryland, announce their new catalog, "Cambridge Conveyor Belts," for the conveying and treatment of industrial products.

✦ ✦ ✦

THE new catalog contains 140 pages and is the most complete reference on woven wire conveyor belts ever published. Special sections, fully illustrated, cover installations in the metal and many other industries.

✦ ✦ ✦

CHAPTERS on "Metals and Alloys," "Conveyor Design," "Installation and Operation," "Tensile Strengths" and "Full Scale Illustrations" should be of value and interest to the Plant Engineer.

✦ ✦ ✦

No O-P-M Reports for Small Tungsten Consumers

SMALL consumers of tungsten are relieved of the burden of filing monthly reports with the Office of Production Management, in Supplementary Order M-29-a, announced by Donald M. Nelson, Director of Priorities.

✦ ✦ ✦

ACCORDING to the terms of the original tungsten order, all users were required to file a monthly report as a prerequisite to receiving deliveries of tungsten. The amendment exempts from this stipulation users of tungsten in quantities of 100 pounds or less of contained tungsten a month.

Fulfillment of the slogan "A Fine Wire for Every Need" established Callite in the wire industry as one of the most reliable sources of supply. You will find quality just as dependable in the present emergency, for Callite is geared to supply you with the same high quality fine wires of uniform finish and with close control of temper and tolerance which will meet the nation's need for uninterrupted production. Specialists in producing fine wires in sizes down to .002" (smaller to specification).

Callite Wires

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Aluminum • Beryllium-copper • Stainless steel • Phosphor-bronze • Silver • Silver bullion wire • Nickel alloys • Brush wire • Monel • Brass — all grades • Commercial bronze • Nickel-silver alloys • Special alloys •

Callite's engineering staff is at your service for development and research on your specific problems. Whatever your needs, investigate Callite fine wires today.

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FOR
QUALITY AND ECONOMY
...SMIT DIAMOND POWDERS

- MADE FROM NEW FINE BORTZ reduced to small, sharp, uniform fragments by a careful crushing and separation process.
- NOT MADE from salvaged waste particles.
- GRADED IN SIZES from number 1 to number 6 by a particle size analyzer so that the fragment sizes are uniform and perfectly adapted to the work for which they are selected.
- FOR BETTER, FASTER WORK.

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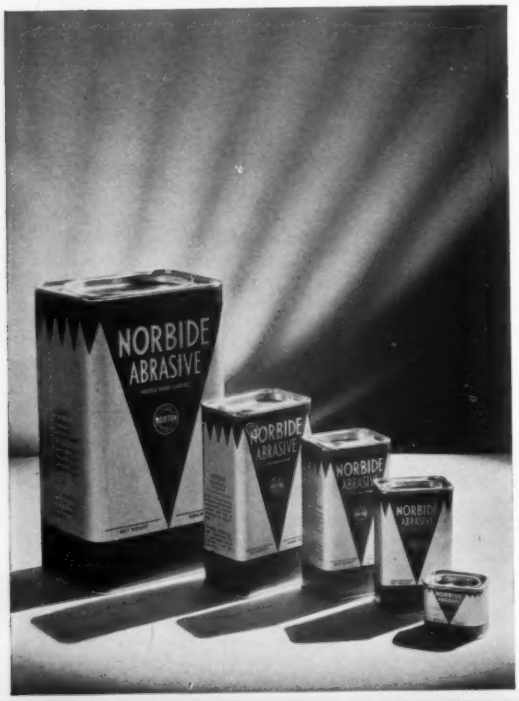

NORBIDE ABRASIVE

For Cemented Carbide Dies

Used in place of diamond dust it reduces the cost of shaping, ripping and finishing.

NORTON COMPANY
WORCESTER, MASS.

N—38

NORTON ABRASIVES

National Defense Features Wire Association Convention

(*Continued from Page 702*)

sized the substitution of materials which was occurring. His conclusion was that probably industry would continue to use the new materials and never return to the use of the original materials.

✦ ✦ ✦

THE discussions on these and other papers presented at the meeting will, after editing, be published in full in the January, 1942 issue of WIRE & WIRE PRODUCTS together with the Mordica Memorial Lecture by **Kenneth B. Lewis**, entitled **"The Shape of Things To Come."**

✦ ✦ ✦

Smoker — Dinner

TURNING to the lighter side of the Convention, the Annual Smoker — Dinner was a "WOW". The house was sold to capacity, the show was even better than last year and a vote of thanks was given to **Mr. A. R. Zapp**, of the Firth-Sterling Steel Company who directed the affair, for the very fine job he did.

✦ ✦ ✦

The National Metal Show

THE **National Metal Show** this year was larger than ever before with over 300 exhibitors occupying 109,000 sq. ft. of space, which compares with 103,000 sq. ft. last year at Cleveland.

✦ ✦ ✦

THE attendance at the **American Society for Metals** was far heavier than usual with technical sessions and exhibits primarily devoted to National Defense problems featuring both the meetings and the show.

✦ ✦ ✦

"Telling Stockholders About Employee Relations"

EMPLOYEE relations are today management's most important concern. Indicative of the increasing importance management attaches to industrial relations is the growing practice of reporting to stockholders company personnel policies and programs.

✦ ✦ ✦

TO determine the extent to which companies are informing the owners of the business

(*Please turn to Page 722*)

America Above All

(*Continued from Page 698*)

the country we and our forebears fought and shed our blood for.

(4) Let us earnestly establish a true patriotic spirit. Today we have great misunderstandings, chicanery and confusion. There is too much petty politics with our national security at stake. The politician thinks in terms of votes and selfishness. We, the people, must recognize a man in political office on his sincere, genuine and courageous actions. Should he make an honest mistake, his voters should recognize his intellectual honesty of thought and action.

✦ ✦ ✦

IN conclusion, I say to you that we must maintain our national security and ideals that our forebears established, and that today and from here out we must raise the cry **America above all others.** We must have national unity of purpose in defending this great America of ours at whatever means it takes to do the job.

✦ ✦ ✦

American Chemical Paint Company Transfers Activities of Tidewater Division to New Plant at Ambler, Pa.

AMERICAN Chemical Paint Company of Ambler, Pa., takes pleasure in announcing the completion of construction of a new modern alkali plant at Ambler, Pa. On and after October 25th the activities of their Tidewater Division will continue to operate in this new plant, manufacturing all alkalies and cleaning compounds formerly manufactured at the Newcastle, Delaware, Tidewater Division.

✦ ✦ ✦

THE Company states that through this change they will have all activities under central control at Ambler and will thus be able to increase the efficiency and promptness of their service to their customers.

✦ ✦ ✦

Scomet Issues New Catalog

A NEW catalog describing the shapes in which it is furnished and giving a general description of and technical data on OFHC (oxygen-free high conductivity copper), produced by **The Scomet Engineering Company,** 420 Lexington Avenue, New York, has just been issued. This catalog may be had by interested persons by addressing The Scomet Engineering Company.

To Wind and Ship Your Cable Wire—

CLARK ALL-METAL SPOOLS. Suited to Insulated Wire, Solder, and similar products.

A spool designed for rigid and permanent assembly in your plant; Ends and Traverses shipped unassembled. One simple operation on a hand or power press (with assembling die which we can furnish) makes a durable winding and shipping spool. The material is cold rolled steel in gauges to meet your demands for strength. All edges curled. All parts lithographed to protect the metal and for display of your design and copy.

Made in 5", 6½", and 10½" diameter Ends; Traverses in 1 15/16" diameter (or special 3½" diameter for 10½" End), in any desired length.

We will gladly send samples and prices at your request.

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Higher and more uniform physical and fatigue properties.

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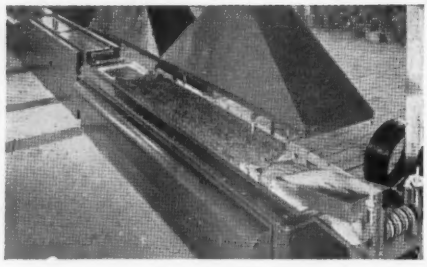

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✦ ✦ ✦

THE grab will handle rolls from 16 inch minimum to 60 inch maximum diameter in lengths up to 72 inches and weights up to 5000 pounds.

✦ ✦ ✦

ALL motions of the grab are motorized and can be controlled from the crane operator's cab. Three motors are provided. One motor spreads and retracts the grab arms. Another squeezes the roll grippers after they have been brought close to the roll, and thus securely locks the roll in position and prevents any possibility of slipping away and falling in transit. The third motor operates the turn-over mechanism which makes it possible to pick up a roll in any position and place it in any other position. Thus a roll piled vertically can be picked up and placed in a horizontal position.

✦ ✦ ✦

WHEN a roll in the vertical position is to be picked up and delivered in a horizontal position, or vice-versa, the turn-over mechanism can be operated while the crane is in motion, thus saving

STEEL WIRE

By MAURICE BONZEL

✦ ✦ ✦

Translated and Published by

Kenneth B. Lewis

Consulting Engineer

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495 pages—414 illustrations

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A molded plastic product, completely resistant throughout its entire mass to acids used in pickling . . . unaffected by rapid temperature changes . . . use it up to 265° F. . . . easy to install as it can be cut and fitted on the job. Reasonably priced. Prompt delivery.

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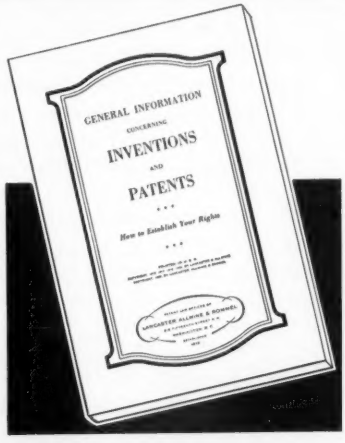

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time that ordinarily would be consumed for this operation.

✦ ✦ ✦

THE grab is especially suitable for the handling of all grades and thicknesses of paper, from light crepe and tissue paper, sound-deadening felt to kraft and hard box board. The grab, or variations of it, is suitable for handling bales, barrels, boxes, etc.

✦ ✦ ✦

The Navy's Share Of the Job

(*Continued from Page 696*)

what is to be his share of accomplishment. He is taught to take care of himself; he begins to learn the rudiments of his profession and to develop, from the outset, his particular talents; then he joins the Fleet of his country. The more exacting the demands, the higher the morale. Never has morale been higher and never have the demands been more exacting. You try it on that far-flung eastern patrol where ships and men are at their posts in constant readiness, night and day. The American man-o'-war's man has no peer in the world: I knew him for forty-seven years.

✦ ✦ ✦

ADDED to the output of **Annapolis** — and I need not tell you of the character of the product of that school — are the Reserves coming in from all civil pursuits in answer to the call. The organized reserves — composite units of officers and men — have months ago joined up at their mobilization stations. The volunteer reserves are at defense schools studying the techniques of aeronautics, engineering, communications, supply and duties of the line, navigation and ordnance and boat handling. Naval officer and Naval Reserve officer together form the Regular Establishment and together they are proud of its history and jealous of its maintenance.

✦ ✦ ✦

WHAT is to be the extent of the eventual employment of

(*Please turn to Page 720*)

HELPS SPEED-UP DEFENSE WORK!

Today . . . speeding up defense production is the wire industry's NUMBER ONE job! In many well-known wire mills, Oakite Composition No. 24 and other Oakite materials help INCREASE OUTPUT in de-greasing and drawing wire.

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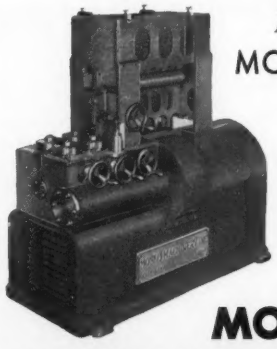

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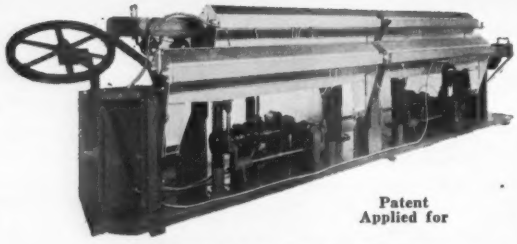

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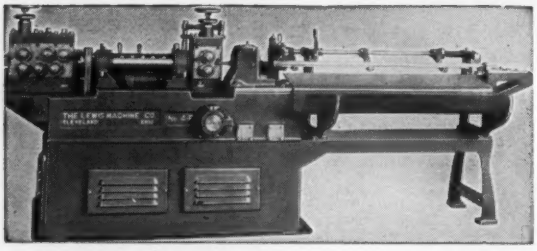

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Conserve Metal for Defense and Increase Profits

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527 FIFTH AVE., NEW YORK — 45 WARBURTON AVE., YONKERS, N. Y.

The Navy's Share Of the Job

(*Continued from Page 719*)

your Fleet is yet to be seen. Certain it is that we are already committed to the material assistance of Great Britain in her heroic struggle. We are to help meet the needs of that nation in order to sustain her in the theatre of war. We have not always seen eye to eye with Great Britain. Our policy has always stood firm for the freedom of the seas and the rights of the neutral. She has believed in voiding all such rights in the name of victory. Today, both victory and the freedom of the seas are at stake and we stand shoulder to shoulder. Moreover, if we are to assist a man in peril we must take help to him. Nothing less, my friends, will do, no matter what the outcome.

✦ ✦ ✦

WE who believe that

"A strong America is the highest contribution to world stability"

must accept the challenge of those who seek to establish, with devastating power, a world of brutal force governed by terror.

✦ ✦ ✦

STRENGTH in arms, yes, in this human world where human means must be employed. But above all, strength in citizenship is needed if we are to survive. Industry and the professions are daily increasing that material. The parent, the church, the school must teach the cherishing of a citizenship which has long been the envy of all nations.

✦ ✦ ✦

SECURITY, then, is the watchword. Security for our lives, our liberties and our possessions which we seek to establish in this day of jeopardy.

✦ ✦ ✦

A GREAT statesman and a wise councilor, **Daniel Webster**, said:

"Nothing can ruin our country if the people themselves undertake its safety and nothing can save it if we leave that safety in the hands of others."

✦ ✦ ✦

IN ourselves our safety lies and the individual responsibility is great: God give us strength to meet it.

Outstanding Personalities Of the Wire Industry

(*Continued from Page 709*)

January, 1931, to March, 1932, he attended the graduate school at the University of Illinois, specializing in mathematical physics, following which he joined the Cold Metal Process Co., Youngstown, Ohio, where he continued his X-ray work and metals research.

✦ ✦ ✦

MR. GOSS holds a number of patents on strip steels such as light gauge high strength tin plate and low alloy high strength strip steels.

✦ ✦ ✦

Gerald B. Duff, The Drever Company

THE Drever Company of Philadelphia, Pa., designer and builder of industrial furnaces and ammonia dissociators, has announced the appointment of **Gerald B. Duff** as their representative in metropolitan New York and northeastern Pennsylvania. He will maintain offices at 67 Clinton Avenue, Newark, N. J.

✦ ✦ ✦

Henry A. Strow, Chief Chemist, MacDermid, Inc.

HENRY A. STROW has recently been appointed chief chemist of MacDermid, Inc., Waterbury, Conn., manufacturers of compounds and processes for cleaning of basic metals. Mr. Strow was employed by the Udylite Corp., as research chemist and more recently as maintenance service engineer of the Detroit Transmission Division of General Motors Corp., Detroit, Mich.

✦ ✦ ✦

George L. Randall, Adv. Mgr., Wickwire Spencer Steel Company

THE appointment of **George L. Randall** as advertising manager was recently announced by Wickwire Spencer Steel Company, New York, and its subsidiary, American Wire Fabrics Corporation. Mr. Randall was first employed by Wickwire Spencer in 1935 as assistant advertising manager. His appointment follows the resignation of **K. A. Zollner,** advertising manager for the past fifteen years.

(*Please turn to Page 722*)

Learn about PARALAN

Paralan will give your finished wire and wire products protection from atmospheric corrosion in the mill and in shipping. Paralan-coated wire can be spot welded or soldered without cleaning. Also, Paralan leaves surfaces in good condition for all types of finishes—enameling, japanning, lacquering, plating, etc.

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WIRE DRAWING LUBRICANTS FOR
HIGH OR LOW CARBON WIRE, COLD HEADING,
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BETTER FINISHED WIRE — LOWER DIE COSTS

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WIRE DRAWING SOAPS

Established 30 years

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Men and materials plus knowledge, skill and experience. A highly skilled staff of craftsmen, guided by experienced engineers who know wire production and working with a specially developed Tungsten Carbide, give WILLEY'S dies a uniformly fine quality.

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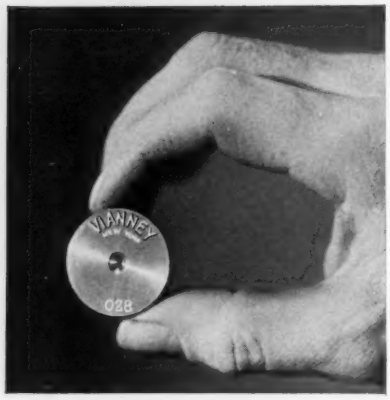

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1207 E. Creighton Ave.
Fort Wayne, Indiana

Outstanding Personalities of the Wire Industry

(*Continued from Page 721*)

A. G. Montgomery

A. G. MONTGOMERY, Assistant Chief Engineer of the American Steel & Wire Company, died at St. Alexis Hospital, Cleveland, Friday evening, October 10.

✦ ✦ ✦

MR. MONTGOMERY was 54 years old and was born in Volga City, Iowa. He was graduated from Pennsylvania State College, as an electrical engineer and joined the American Steel & Wire Company as District Engineer in Pittsburgh in 1914. He has held a variety of engineering positions with the company, in Pittsburgh and Cleveland, and was appointed Assistant Chief Engineer in 1939. He served as a lieutenant in the U. S. Army during the World War.

✦ ✦ ✦

"Telling Stockholders About Employee Relations"

(*Continued from Page 716*)

about personnel activities, the **Policyholders Service Bureau** of the **Metropolitan Life Insurance Company** reviewed the annual reports of 235 companies for 1938 and 1939 and studied other methods employed for this purpose. The results of this investigation are presented in a special report entitled "Telling Stockholders About Employee Relations."

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UNIVERSAL WIRE REEL

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FLYING SHEAR

for round and shaped wire.

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2—Baird No. 3 & S3F 4 Slide Wire Machines
7—Waterbury Step Cone Wire Drawing Machines
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6—Lewis Welding Wire S & C Machines M. D.
2—Shuster Shaped Wire S & C Machines ½" & ⅞"
8—Shuster Round Wire S & C Machines 1/32"-½"

Wanted: Tack Making Machinery. All Sizes.

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EST. 1917

✦ ✦ ✦

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In Rounds

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Wire Measuring

PRODUCTIMETERS

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WANTED

Flat wire, cold rolled strip and sheet. New or obsolete lots.

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300 Meserole St., Brooklyn, N. Y.

MORE than two-thirds of the annual reports of these companies, this study reveals, contain information on employee relations. Concrete evidence of the growth of this practice is revealed by the fact that five years earlier in a similar study, only one-fourth of the companies whose reports were studied gave such information to stockholders. Particularly illuminating is a table listing 65 industrial relations subjects found in present-day stockholder reports, and comparing the frequency with which such topics were discussed in annual reports for the years 1934 and 1935.

✦ ✦ ✦

ANNUAL reports are the most commonly used means for informing stockholders of personnel activities, and a major portion of the Bureau's study is devoted to analysis of this medium. Case examples are presented showing how companies treat such subjects as personnel policies, labor economics, review of personnel activities, new personnel problems, employee recreation, and labor costs. Several illustrations from annual reports are reproduced in this study.

✦ ✦ ✦

THE present survey also covers other methods for giving stockholders information on employee relations. It discusses interim reports, dividend enclosures, and special booklets, citing examples of each of these methods.

WIRE SPOOLING MACHINERY
SCREW MACHINE PRODUCTS
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Division of

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Leading manufacturers of

OVERHEAD MATERIALS HANDLING EQUIPMENT

for the Wire and Wire Products Industry

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ZINC WIRE
ZINC STRIP
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Designers and Builders of Gas-Fired Heat Treating Furnaces for Ferrous and Non-Ferrous Wire.
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Main Plant and General Offices—Toledo, Ohio

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Machinery For
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WIRE DRAWING MACHINERY AND EQUIPMENT
Rod Frames — 16" Frames, 8" Frames — Take-Up Frames, Wire Pointers — Puller Tongs.
General Castings for Wire Mill use. Circulars on Request.
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MOSSBERG
PRESSED STEEL CORP.
ATTLEBORO, MASS.
STEEL REELS AND SPOOLS

Wire Drawing Lubricant Circulating Systems

(*Continued from Page 700*)

tion, which is dumped into the reservoir.

10. Some years ago, the principle of solvent extraction of copper soap was set forth (2). Since copper soap is soluble in light petroleum oil, such as ordinary paraffin oil (Saybolt Vis. of 100 sec. @ 100 F.), a layer of such oil on the surface of a wire drawing solution continuously extracts copper soap from the solution. This results in better settling of copper dust and a cleaner lubricant.

This principle is now receiving attention from wire mill engineers. In practice, a layer 3 to 4 inches thick is advisable and it is necessary to have the return line enter the solution beneath the surface to prevent disruption of the layer. The layer of oil, when saturated, can be drawn off by suitably located valves on the side of the reservoir, or it can be pumped off. The illustration indicates this extraction diagrammatically.

✦ ✦ ✦

SUMMARY

MANY of the points presented in this paper are well known and are practiced in mill operations. Some have received too little attention, and it is hoped that this paper may stimulate further progress on handling lubricant solution.

✦ ✦ ✦

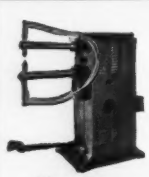
References

(1) Jour. of Physical Chem. Vol. XXXVI, P. 3108, 1932.
(2) U. S. Patent 1,955,522.

✦ ✦ ✦

"Merchant Steel" Priorities Given A-9 Priority Rating

INCLUDED in the above announcement was the statement that on fencing and nails, the allotment is 70 percent of usual needs. With repair of old fences and with delay where possible in putting up new fences, farmers can probably get along with the metal allotted for fencing. There's no suitable substitute for nails so we'll just have to make the available nails go around.


Floor Type
Foot Operated

Spot Welders for Quick Delivery
Cuts costs. Ideal for wire products fabricators. Speeds production. Constant economical service. Write for full information on our complete line. Quick deliveries.
UNIVERSAL POWER CORP.
4304 EUCLID AVE. CLEVELAND, OHIO

ROYLE
PATERSON N J
BUILDING EXTRUDERS SINCE 1880
Insulating Machinery for Western Electric Continuous Vulcanizing process.
JOHN ROYLE & SONS
PATERSON, N. J.
British Agency: James Day (Machinery) Ltd., The Grange Whetstone Nr. Leicester, England

APCO MOSSBERG CO.
the original Frank Mossberg Co.
Manufacturers of Reels and Spools
Attleboro, Mass.

JLE SPARK - TESTING EQUIPMENT FOR INSULATED WIRE AND RUBBER HOSE JLE
JAMES L. ENTWISTLE
43 CHURCH ST. PAWTUCKET, R. I.

DAVIS
SPARKERS
R. L. DAVIS ELECTRIC CO.
340 Center Street,
Wallingford, Conn.

WRAPPING MACHINES
Coil & Straight Length
TERKELSEN MACHINE CO.
320 A Street Boston, Mass.

SPOOLS AND REELS
FOR THE WIRE INDUSTRY
Hubbard Spool Company
1622 Carroll Ave. Chicago, Ill.

SCOTT TESTERS
For WIRE, RUBBER, TEXTILES, PAPER, Etc.
HENRY L. SCOTT CO.
PROVIDENCE, R. I.

WIRE, WIRE ROPE AND ELECTRIC CABLE MACHINERY
THOMSON-JUDD
WIRE MACHINERY COMPANY
SUBSIDIARY OF THOMSON-GIBB ELECTRIC WELDING COMPANY
LYNN, MASSACHUSETTS
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WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Directory, Index & Buyers' Guide.

ABRASIVES—
Norton Co., Worcester, Mass.

ACCUMULATORS—
Farrel-Birmingham Co., Inc., Ansonia, Conn.

AIR DRAW FURNACES—
Carl-Mayer Corp., The, Cleveland, Ohio

ANNEALING MACHINES—Open Flame
Syncro Machine Co., Rahway, N. J.

ANNEALING POTS AND BOXES—
National Annealing Box Co., Washington, Penna.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.

ANTI-RUST COMPOUND—
National Oil Products Co., Harrison, N. J.

ARMORING EQUIPMENT—
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

AUTOMATIC SPARK TESTING EQUIPMENT—
Entwistle, James L., Pawtucket, R. I.

BAKERS—Hi-Speed
Carl-Mayer Corp., The, Cleveland, Ohio

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Moslo Machinery, Inc., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

BANBURY MIXERS—
Farrel-Birmingham Co., Inc., Ansonia, Conn.

BARRELS—Air Blast
Dreisbach Engr. Corp., Yonkers, N. Y.

BERYLLIUM COPPER—Strip and Bars
Callite Tungsten Corp., Union City, N. J.

BLOCKERS—
Farrel-Birmingham Co., Inc., Ansonia, Conn.

BOBBINS—Braider and Wire Weaving
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BORTZ—Diamond
Smit, J. K., & Sons, Inc., New York, N. Y.

BRICKS—Acid Proof
Keagler Brick Co., Steubenville, Ohio

CALIPERS—Roll
Farrel-Birmingham Co., Inc., Ansonia, Conn.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CASTINGS—Wire Mill
Farrel-Birmingham Co., Inc., Ansonia, Conn.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANERS—Hand and Metal
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANING & PICKLING EQUIPMENT—
Broden Construction Co., Cleveland, Ohio
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Haveg Corp., Newark, Del.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

CLOTH TESTERS—
Scott, Henry L., Co., Providence, R. I.

CLOTH—Wire, All Metals
Callite Tungsten Corp., Union City, N. J.

COATING—Protective
American Lanolin Corp., Lawrence, Mass.
National Oil Products Co., Harrison, N. J.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, Ohio
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.

COILERS AND SPOOLERS FOR INSULATED WIRES—
Entwistle, James L., Pawtucket, R. I.

WHERE TO BUY, Continued

COLD HEADERS—
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Wire Drawing
National Oil Products Co., Harrison, N. J.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUSTOM WIRE DRAWING—
Hy-Carbo Steel Co., Lowell, Mass.

CUTTING TOOLS—Carbide
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

DIAMONDS—Industrial
Callite Tungsten Corp., Union City, N. J.

DIAMOND POWDERS—
Rusch Wire Die Corp., New York, N. Y.
Smit, J. K., & Sons, Inc., New York, N. Y.

DIAMOND TOOLS—
Rusch Wire Die Corp., New York, N. Y.

DIES—Diamond
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Corp., New York, N. Y.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Krause, F., & Co., Inc., Jersey City, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Jersey City, N. J.

DIES—Lead Extrusion
Robertson, John, Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Fort Wayne Wire Die, Inc., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Krause, F., & Co., Inc., Jersey City, N. J.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Wayne Wire Die Co., Jersey City, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Rod & Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Tungsten Electric Corp., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIRECT ELECTRIC RESISTANCE HEAT TREATING—
Trauwood Engineering Co., Cleveland, Ohio

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Stevens Metal Products Co., Niles, Ohio

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

ENGINEERS—Consulting Wire Mill
Hartley, George D., Worcester, Mass.
Lewis, Kenneth B., Worcester, Mass.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn.
Entwistle, James L., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FLASH BAKER—
Carl-Mayer Corp., The, Cleveland, Ohio

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion Corp., Toledo, Ohio
Trauwood Engineering Co., Cleveland, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion Corp., Toledo, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio
Firth-Sterling Steel Co., McKeesport, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio
Surface Combustion Corp., Toledo, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Electric
Electric Furnace Co., Salem, Ohio
Surface Combustion Corp., Toledo, Ohio
Trauwood Engineering Co., Cleveland, Ohio

FURNACES—Hardening & Tempering
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion Corp., Toledo, Ohio
Trauwood Engineering Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Robertson, John, Co., Brooklyn, N. Y.
Surface Combustion Corp., Toledo, Ohio

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion Corp., Toledo, Ohio

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion Corp., Toledo, Ohio

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio
Surface Combustion Corp., Toledo, Ohio

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Surface Combustion Corp., Toledo, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING EQUIPMENT—
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING KETTLES—
National Annealing Box Co., Washington, Penna.

GATES—Blast, For Low Pressure Air
Farrel-Birmingham Co., Inc., Ansonia, Conn.

GEARS—Continuous Tooth Herringbone
Farrel-Birmingham Co., Inc., Ansonia, Conn.

GEARS—Wire Mill
Farrel-Birmingham Co., Inc., Ansonia, Conn.

GRINDERS—Roll
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Norton Co., Worcester, Mass.

HI-SPEED BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

INHIBITORS—
American Chemical Paint Co., Ambler, Pa.
National Oil Products Co., Harrison, N. J.

INSTRUMENTS—Electrical
Entwistle, James L., Pawtucket, R. I.

KETTLES—Galvanizing, Annealing, Tinning, etc.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
National Annealing Box Co., Washington, Penna.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—
Warner Company, The, Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Miller, R. H., Co., Inc., Homer, N. Y.
National Oil Products Co., Harrison, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Miller, R. H., Co., Inc., Homer, N. Y.
National Oil Products Co., Harrison, N. J.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Bunching
American Insulating Mach'y. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y. Co., Phila., Pa.
Entwistle, James L., Pawtucket, R. I.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Coilers
Broden Construction Co., Cleveland, Ohio
Entwistle, James L., Pawtucket, R. I.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

WHERE TO BUY, Continued

MACHINERY—Covering Wire
Fidelity Machine Co., Philadelphia, Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, Ohio
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery, Inc., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Die Making
Firth-Sterling Steel Co., McKeesport, Pa.

MACHINERY—Draw Benches
Standard Machinery Co., Providence, R. I.

MACHINERY—Edging
Standard Machinery Co., Providence, R. I.

MACHINERY—Enameling
American Insulating Mach'y. Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Extruding
Farrel-Birmingham Co., Inc., Ansonia, Conn.
National Erie Corp., Erie, Pa.
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.

MACHINERY—Galvanizing
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Grinding, Roll
Farrel-Birmingham Co., Inc., Ansonia, Conn.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Fidelity Machine Co., Philadelphia, Pa.
National Erie Corp., Erie, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY—Measuring Wire & Cable
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Paper Covering Wire
Terkelsen Machine Co., Boston, Mass.

MACHINERY—Pointing
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, Ohio
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, Ohio
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Farrel-Birmingham Co., Inc., Ansonia, Conn.
National Erie Corp., Erie, Pa.
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Strip Covering
Farrel-Birmingham Co., Inc., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
Farrel-Birmingham Co., Inc., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Emory, Robert J., Co., Newark, N. J.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, Ohio
Hallden Machine Co., The, Thomaston, Conn.
Lewis Machine Co., The, Cleveland, Ohio
Moslo Machinery, Inc., Cleveland, Ohio
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, Ohio
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing
Entwistle, James L., Pawtucket, R. I.
Scott, Henry L., Co., Providence, R. I.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
Shuster, F. B., Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Entwistle, James L., Pawtucket, R. I.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Sub. of Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Rahway, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MACHINERY—Wrapping Wire
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

WHERE TO BUY, Continued

METAL CLEANING—Dry Process
Dreisbach Engr. Corp., Yonkers, N. Y.

MILLS—Rod, Bar, etc.
Farrel-Birmingham Co., Inc., Ansonia, Conn.

MILLS—Strip, Hot and Cold for Iron, Steel, Copper, Brass, etc.
Farrel-Birmingham Co., Inc., Ansonia, Conn.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
National Oil Products Co., Harrison, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Inc., Newark, N. J.

PAPER TESTERS—
Scott, Henry L., Co., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
National Oil Products Co., Harrison, N. J.

PICKLING TANK LININGS—
Keagler Brick Co., Steubenville, Ohio

PIPING AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

PLASTIC TESTERS—
Scott, Henry L., Co., Providence, R. I.

POTS—Lead Melting
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

PRESSES—Lead
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

RECORDERS—Fault and Reel
Entwistle, James L., Pawtucket, R. I.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Moslo Machinery, Inc., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Rahway, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Constant Tension
Farrel-Birmingham Co., Inc., Ansonia, Conn.

REELS—Steel
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS AND SPOOLS—Shipping and Shop
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REELS—Takeoff
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Vulcanizing and Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Co., New Haven, Conn.
Stevens Metal Products Co., Niles, O.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio
Moslo Machinery, Inc., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

ROLLS—Iron, Steel, Alloy
Farrel-Birmingham Co., Inc., Ansonia, Conn.

ROLLS—For Strip, Rod, Bar Mills
Farrel-Birmingham Co., Inc., Ansonia, Conn.

ROLL STRAIGHTENERS—
Moslo Machinery, Inc., Cleveland, Ohio

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott, Henry L., Co., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

SOAPS—Industrial and Wire Drawing
Miller, R. H., Co., Inc., Homer, N. Y.
National Oil Products Co., Harrison, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

SPARK TESTING EQUIPMENT—
Entwistle, James L. Pawtucket, R. I.

SPOOLS—Annealing and Wire Drawing
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Shipping and Shop
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

SPOOLS—Steel
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L., Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, O.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STRIP METAL TESTERS—
Scott, Henry L., Co., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TAKE-UPS FOR CABLE, HOSE, LEAD PRESSES AND SHEET RUBBER—
Entwistle, James L., Pawtucket, R. I.

TANK LININGS—Brick
Keagler Brick Co., Steubenville, Ohio.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Haveg Corp., Newark, Del.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.

TENSILE TESTERS—
Scott, Henry L., Co., Providence, R. I.

TESTING INSTRUMENTS—
Entwistle, James L., Pawtucket, R. I.
Scott, Henry L., Co., Providence, R. I.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—Friction and Power Driven
Standard Machinery Co., Providence, R. I.

VALVES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Micro Products Co., Chicago, Ill.
Moslo Machinery, Inc., Cleveland, Ohio
Universal Power Corp., Cleveland, Ohio

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE DRAWING—High Grade Custom
Hy-Carbo Steel Co., Lowell, Mass.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.

WIRE—Enameled for Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE-MANUFACTURERS—
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Nickel Silver and Phosphor Bronze
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.

WIRE—Non-Ferrous to Specification for Special Purposes
Callite Tungsten Corp., Union City, N. J.
Hudson Wire Co., Ossining, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Stainless Steel
Callite Tungsten Corp., Union City, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Keystone Steel & Wire Co., Peoria, Ill.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott, Henry L., Co., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Inc., Newark, N. J.

YARN TESTERS—
Scott, Henry L., Co., Providence, R. I.

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FINE WIRES IN ALL METALS

TWO MODERN AND COMPLETE WIRE PLANTS—— AT YOUR SERVICE——

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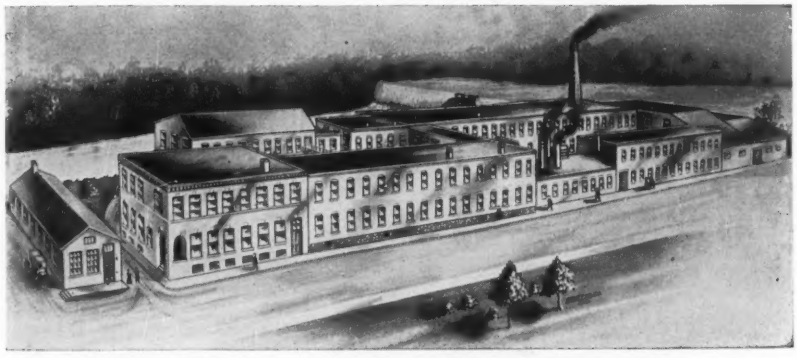

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High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze, Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Tinsel Lahns, Silver Plated Copper, False Gold and Copper.

Cadmium, Nickel Silver, 10%, 18% and 30%; Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification, Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

WIRES FOR METAL SPRAYING

Pure Lead, Lead Alloy, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire, High Conductivity, Electric Wire.

Cadmium, Nickel Silver, (10%, 18%, 30%); Aluminum, Monel Metal, Phosphor Bronze, Pure Nickel, Commercial Bronze.

"HUDCO" specially processed Copper Wire for enamelling purposes is drawn from Selected Copper, insuring the maximum conductivity. This is but one example of the use of the most advanced and approved materials and methods in our processing. BETTER WIRE AT LOWER COST.

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OSSINING, N. Y.

SUCCESSORS ROYLE & AKIN

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WINCO enamelled wire is covered to the same dimensions as fabric-covered wire so the user need not change his equipment. It will withstand softening in varnish-dipping and baking.

WINCO enamelled wire is lower in cost than silk covered wire. Write for sample.

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HUDSON WIRE COMPANY

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EF FURNACES

For Every Industrial Heat Treating Process

This Combination Gas-Electric Furnace

With Heavy V-type EF Cast Grid Heating Elements
and EF Gas-Fired Recuperative Type Radiant Tubes

Bright Anneals 1¼ Tons Copper Wire Per Hour

Copper Wire in reels up to 21" in diameter and rod in coils up to 36" in diameter are bright annealed — continuously, in the above EF combination Gas-Electric special atmosphere furnace.

This furnace is equipped with EF bulkhead type trays as shown in the illustration. This type tray provides an effective seal for the protective atmosphere and eliminates the necessity of doors, lock chambers, or other sealing devices at either the charging or discharging end of the furnace.

The heating chamber is divided into two separately and automatically controlled zones. The first or charging zone is heated by means of EF gas fired recuperative type radiant tubes. The second or soaking zone is equipped with heavy V-type EF cast alloy grids.

The heating elements in each zone are located both above and below the charge, and extend the entire width of the chamber, insuring absolute temperature uniformity throughout the charge.

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